Installation and Maintenance Manual	IM 782-4

Destiny™ Air Handler

Group: **Applied Air**
Part Number: **IM 782**
Date: **March 2009**

Sizes 002 to 030

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McQuay® Air Conditioning

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General Information

⚠ WARNING

Improper installation or maintenance can cause equipment damage or personal injury.
Installation and maintenance must be performed by qualified personnel familiar with applicable codes and regulations, and experienced with this type of equipment.

⚠ AVERTISSEMENT

Une installation ou un entretien inadéquats peut endommager l'équipement ou entraîner des blessures personnelles. L'installation et l'entretien doivent être exécutés par un personnel qualifié, familier avec les codes et règlements applicables et possédant de l'expérience avec ce type d'équipement.

⚠ CAUTION

Sharp edges and coil surfaces can cause personal injury. Avoid contact with them.

⚠ ATTENTION

Les bords tranchants et les surfaces des bobines sont un risque de blessure. Ne les touchez pas.

⚠ CAUTION

Destiny units are not designed to be weather resistant; **DO NOT install outdoors**.

⚠ ATTENTION

Les Unités Destiny ne sont pas à l'épreuve des intempéries; NE PAS les installer à l'extérieur.

⚠ WARNING

Improper grounding may result in severe injury or death. Check grounding nut tightness before connecting power to the external junction box.

⚠ AVERTISSEMENT

Une mise à la terre défaillante peut causer des blessures graves ou la mort. Vérifiez l'étanchéité des vis de mise à terre avant d'alimenter la boite de jonction externe.

⚠ WARNING

Fan motor requires overload protection.
Failure to provide motor overload protection can result in fire, property damage, electric shock, personal injury or death.
Connect motor to an overload protective device rated in compliance with local electric codes.

⚠ AVERTISSEMENT

Risques d'incendie. À défaut d'installer un sectionneur à fusible à action rapide de type J, cela peut entraîner des dommages à la propriété, des blessures ou la mort.
Un sectionneur à fusible à action rapide de type J doit être installé avant le variateur de fréquence

Smoke Control and Management Systems

The system design and installation must follow accepted industry practice, such as described in the ASHRAE Handbook, the National Electric Code, and other applicable standards. The installation of this equipment must be in accordance with regulations of authorities having jurisdiction and all applicable codes. It is the responsibility of the installer to determine and follow the applicable codes.

⚠ WARNING

Improper smoke or fume air handling can result in severe personal injury or death.
A registered professional engineer must design and approve the air conditioner and air handler application to make sure smoke and fume control meet local fire codes and NFPA requirements for the specific building application.
Due to the wide variation in building design and ambient operating conditions into which our products can be applied, we do not represent or warrant that our products will be fit and sufficient for smoke and fume control and management purposes. The owner and building designer must consult a registered professional engineer to satisfy themselves in this regard.

⚠ AVERTISSEMENT

Un traitement inadéquat de l'air contenant de la fumée peut entraîner des blessures personnelles ou même la mort.
Un ingénieur professionnel doit faire la conception et approuver l'unité de traitement d'air et son application pour s'assurer que le contrôle de la fumée rencontre les codes d'incendies locaux et les normes NFPA pour l'application spécifique du bâtiment.
Dû à la grande diversité de conceptions des édifices ainsi que des conditions d'opération ambiantes dans lesquelles nos produits peuvent être appliqués, nous n'avançons ni ne garantissons que nos produits seront adéquats et efficaces quant au contrôle de la fumée. Le propriétaire et le concepteur du bâtiment doivent consulter un ingénieur professionnel à cet égard

Receiving and Handling

1. Carefully check items against the bills of lading to verify all crates and cartons were received. Carefully inspect all units for damage when received. Report visible and concealed damage immediately to the carrier and a file a claim for damage.
2. Destiny air handler units are thoroughly inspected before leaving the factory. Install units carefully to prevent damage.
3. Leave enough space around the unit for proper maintenance, filter removal, lubrication, belt adjustment, and removal of coils, if necessary (refer to Figure 2 for service clearances).
4. Use flexible connections on the inlet and outlet duct connections of the unit.
5. For 002 - 010 sized ceiling hung units, spring isolation of the cabinet is recommended.
6. All fans are dynamically balanced before leaving the factory. Carefully inspect fans for rough handling that can cause misalignment or a damaged shaft.
7. Adequately pitch and trap drain line from drain pan connection.

Storing the Unit

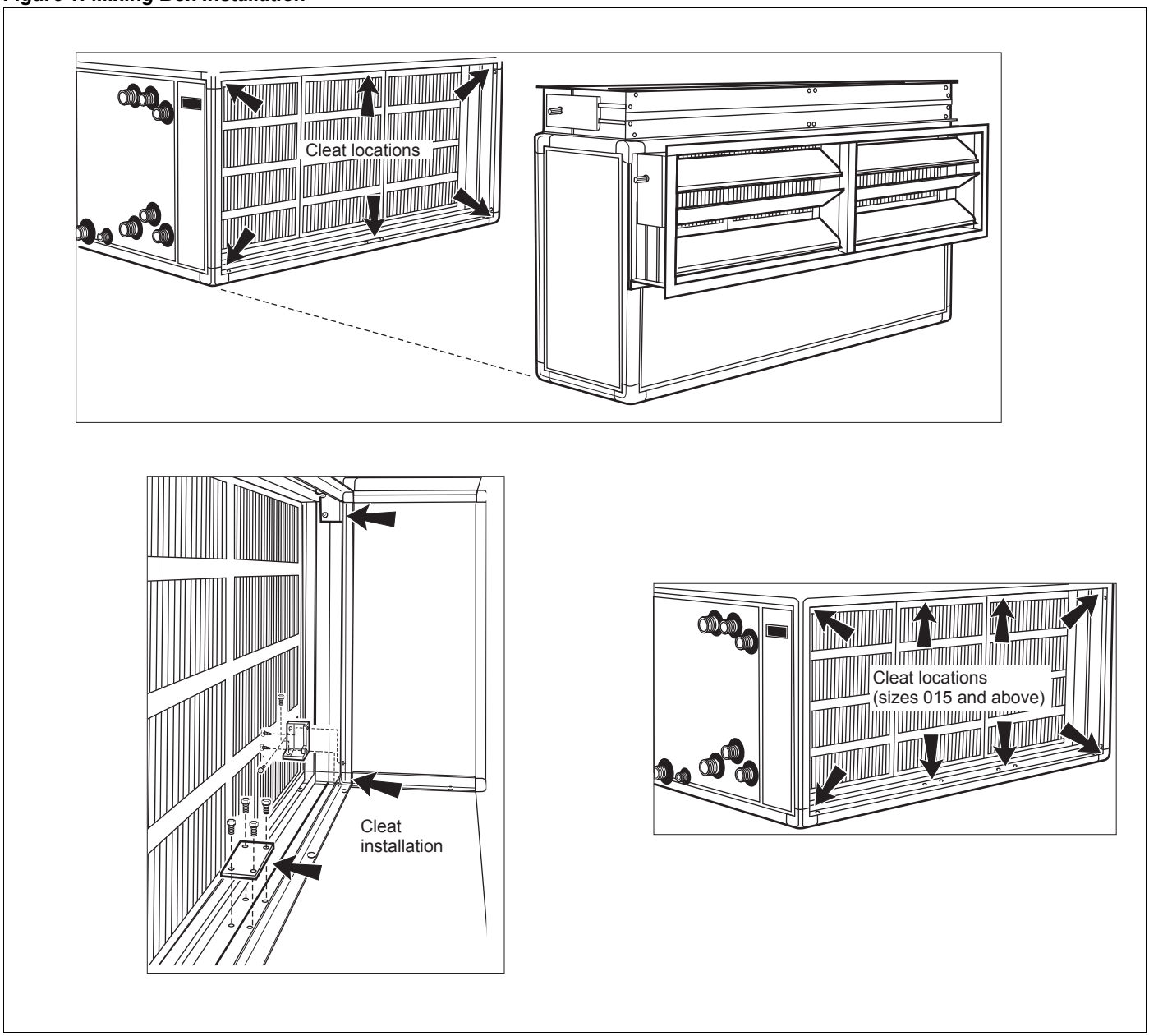
Store unit on a level surface. If air handling units are to be stored for any period of time, it is important to rotate the fan wheel (quarterly, as a minimum) to prevent permanent distortion of drive components. Keep the fan bearings lubricated. Grease may settle in the lower part of the bearing, which may lead to oxidation on the upper portion of the bearing surface.

Store units indoors in a clean, dry environment on a level surface. Moisture, debris, and minerals can cause permanent damage to the cabinet and components. Do not allow coverings to trap moisture on the galvanized surface.

Attaching the Mixing Box

Mixing boxes ship with Destiny units as a field-installed option. Attach the mixing box to the intake end of the air handler using cleats included with the mixing box section. Install the cleats into the interior mounting frames, with the hardware included as shown in Figure 1.

Figure 1: Mixing Box Installation



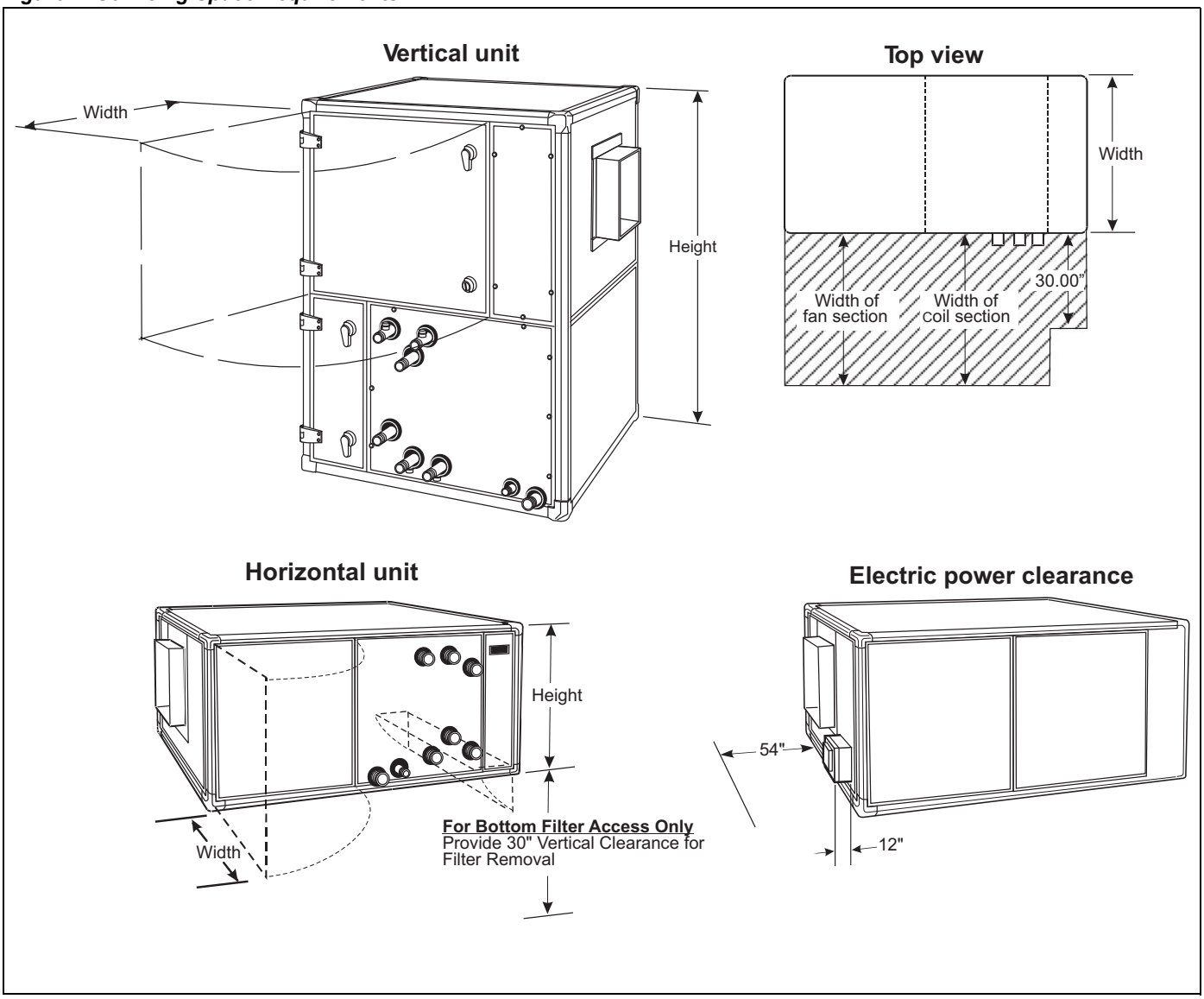
Service Clearances

Leave adequate space around the unit for piping, coils, and drains. Always have access to at least one side of the unit for regular service and maintenance. See Figure 2 for servicing space requirements. Routine maintenance examples include filter replacement, drain pan inspection and cleaning, fan bearing lubrication, and belt adjustment. Provide sufficient space on the drive side of the fan and the connection side of the coil for shaft and coil removal, if necessary (refer to the "Coil Data" section in Catalog 580 for information about coil sizes). Both the fan drive and coil can be field modified to right or left hand to accommodate clearance restrictions. See "Reversing the Coil Handing" on page 9 and "Reversing the Drive Package" on page 11.

For routine maintenance, remove panels on either side of the unit. See "Panel Removal" on page 8. Optional service doors are available for the fan and filter sections. Allow sufficient space for service door(s) to swing completely open, or to meet the clearance requirement of the section it accesses, whichever is greater. Service doors are not interchangeable with access panels on the opposite side of the unit. Determine clearances before specifying doors.

Have at least 54" of clearance in front of electrical power devices (starters, VFDs, disconnect switches, and combination devices). Electrical power devices that are mounted on the side of the unit typically are 12" deep (see Figure 2).

Figure 2: Servicing Space Requirements

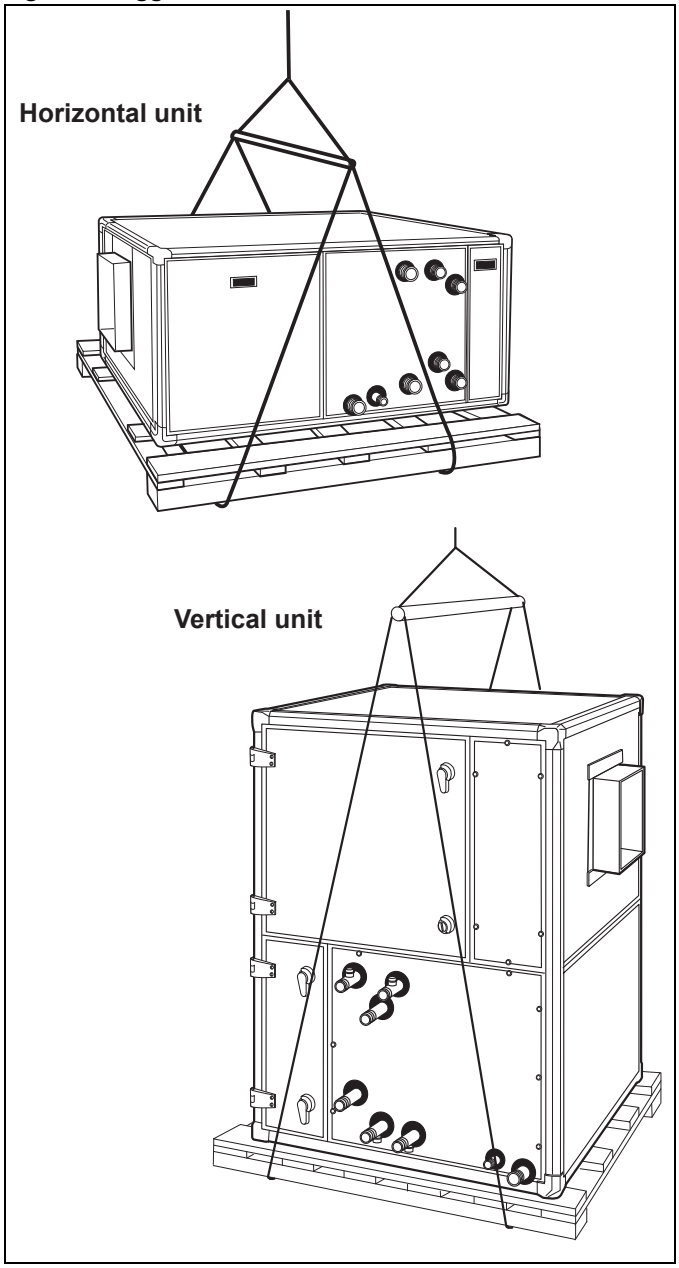


Rigging

Rig units using straps or a sling. Fasten strapping under the skid that ships with the section. If a field-installed mixing box is attached, adjust to balance the unit properly.

To avoid damage to the unit cabinetry, use spreader bars. Position spreader bars to keep cables from rubbing the frame, connections, or panels. Before hoisting into position, test lift for stability and balance. Avoid twisting or uneven lifting of the unit.

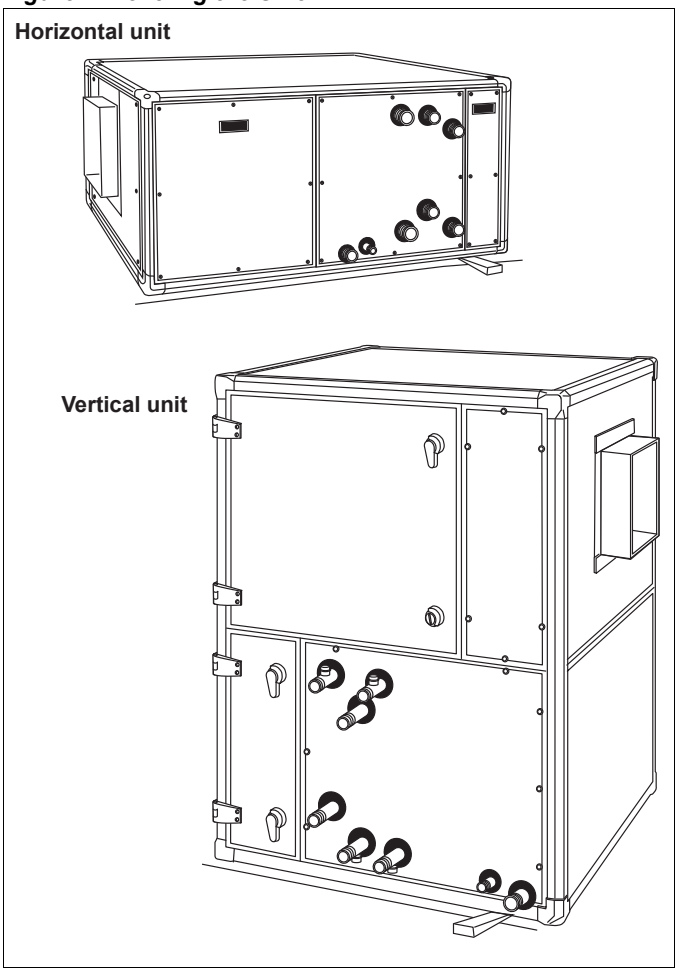
Figure 3: Rigged Unit on Skids



Unit Leveling

Place the equipment on a flat and level surface (or verify that unit is level when hanging from the ceiling). Where the surface irregularities allow the equipment to distort, shim the base of the unit to a straight line. Distorted units can cause misfit or binding of the doors and panels and improper draining of drain pans.

Figure 4: Leveling the Unit



Panels and Doors

⚠ DANGER

Hazardous moving parts, high static pressure, and/or high voltage. Can cause severe injury or death.
Disconnect and lock **ALL** electric power off before entering or servicing unit. Unit may employ multiple power supplies and/or remote disconnects.
Secure drive sheaves to prevent motors and fan from free wheeling.
When leaving the unit, use screw or door handle locking mechanism provided to secure access panel closed and prevent unintentional entry.

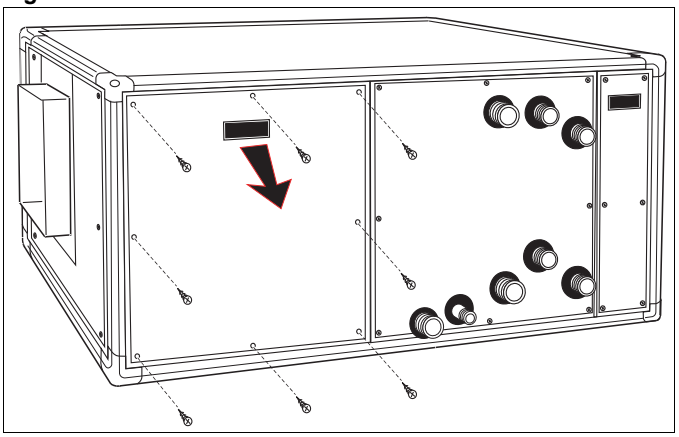
⚠ DANGER

Pieces mobiles dangereuses, haute pression statique et/ou de hautes tensions. Risques de blessures graves, voire mortelles.
Débranchez et verrouillez toutes les alimentation électriques avant de pénétrer ou d'intervenir sur cet appareil. Cet appareil peut étre alimenté par plusieurs sources etlou par l'intermédiaire de plusieurs disjoncteurs éloignés.
Attachez les disques d'entrainement afin d'éviter que les moteurs et le ventilateur ne tournent librement.
A la sortie de l'appareil, fermer le panneau d'accès avec la vis ou avec le mécanisme de verrouillage de la poignée de porte qui sont founis pour éviter toute entrée inopinée.

Panel Removal

Destiny air handlers have pocket pull handles in alternate sections that allow side panels to be easily removed and handled. To gain access through a side panel, remove the fasteners along the sides of the panel and lift the panel off using the pocket pull handle. If the panel you are accessing does not have a pocket pull handle, remove an adjoining panel with a pocket pull handle and push the panel out from inside the unit.

Figure 5: Panel Removal

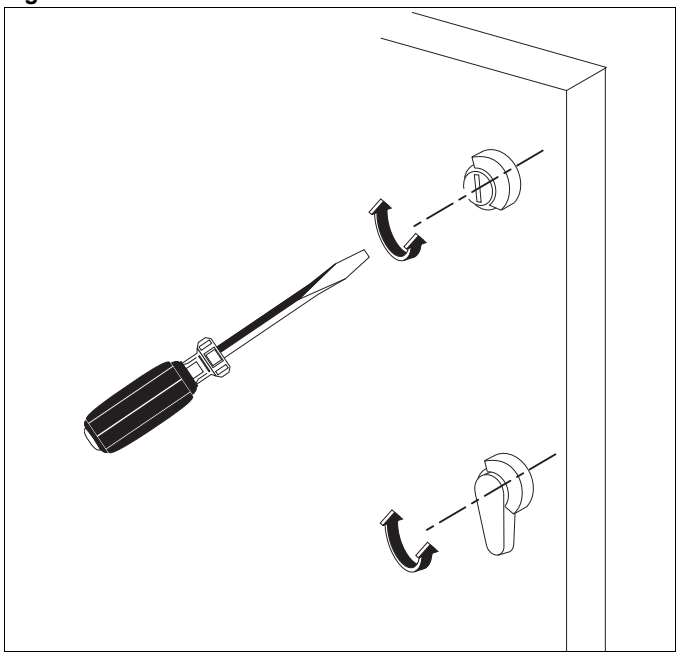


Fan Section Doors

1 Use a flat head screwdriver and rotate the screw 1/4 turn as shown in Figure 6.

2 Rotate door handle 1/4 turn and open the door.

Figure 6: Fan Section Doors



Actuators

The factory-mounted actuator has been initially adjusted in the factory. Power and control wiring, as well as fine-tuning adjustment, is to be performed in the field.

The installing contractor is responsible for the mounting of all field-installed actuators. An actuator mounting plate is provided on the shaft side of the damper frame to accommodate many actuators. However, due to the number of options, size variations, and arrangements available, some actuators may require alternate field provided mounting hardware. Provide proper support for the actuator to avoid excessive stress in the cabinet, linkage, or damper shafts.

Fresh air and return air dampers can be linked together and driven from the same actuator if the dampers are the same size. If the dampers are different sizes, they must be driven by separate actuators and controlled appropriately.

A typical rotary electric actuator can handle up to 40 square feet of damper. For pneumatic actuators, allow 5 in.-lb. per square foot of damper area.

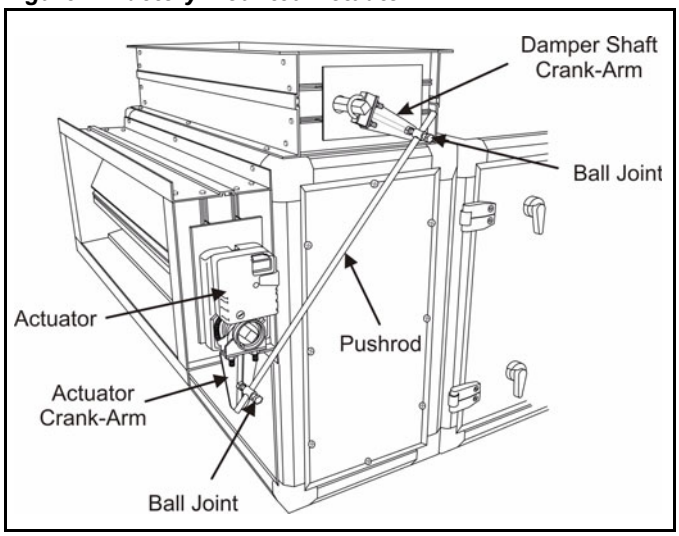
⚠ CAUTION

Maximum damper rotation is 70°. Maximum shaft torque is 205 in.-lb. Greater rotation or torque can cause equipment damage.

⚠ ATTENTION

La rotation maimale des volets est de 70°. Le couple (torque) maximum de l'arbre est de 205 in./lb. Une plus grande rotation (ou torque) peut endommager l'équipement.

Figure 7: Factory Mounted Actuator



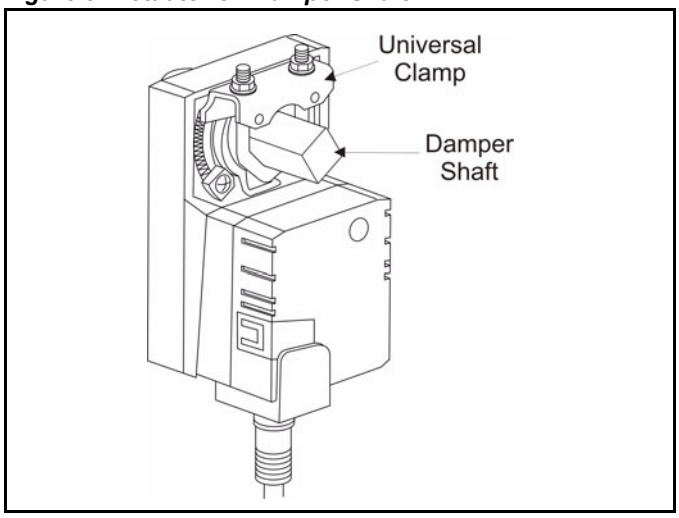
For good air flow control, adjust the linkage so that the damper blades do not open beyond 70°. Opening a damper blade beyond 70° will have little effect on unit performance.

Do not “over-close” the low-leak damper blades as the blades may lock up if the accompanying seal goes over the center of the adjoining blade. Instead, close the damper blades until the edge seal just lightly contacts the adjoining blade.

Installing Damper Actuator

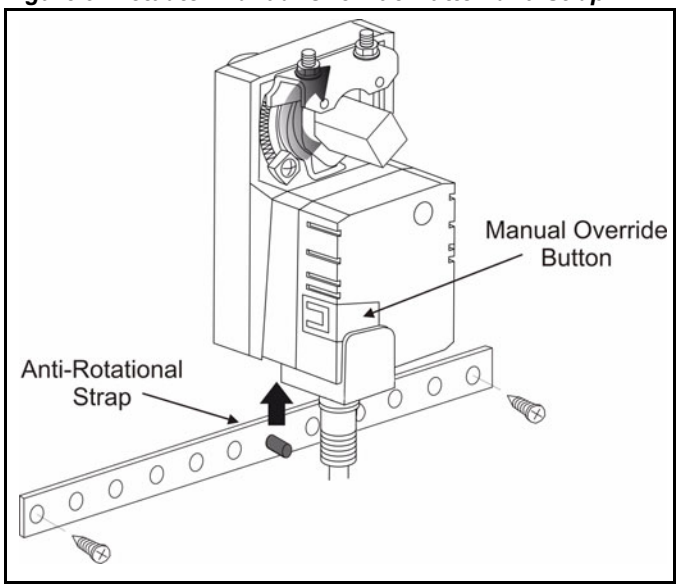
1. Turn the damper shaft until the blades are fully closed.
2. Place the actuator’s universal clamp over the damper shaft (Figure 8). Make sure that the controls on the actuator cover are accessible. Place the actuator in the desired mounting position.

Figure 8: Actuator on Damper Shaft



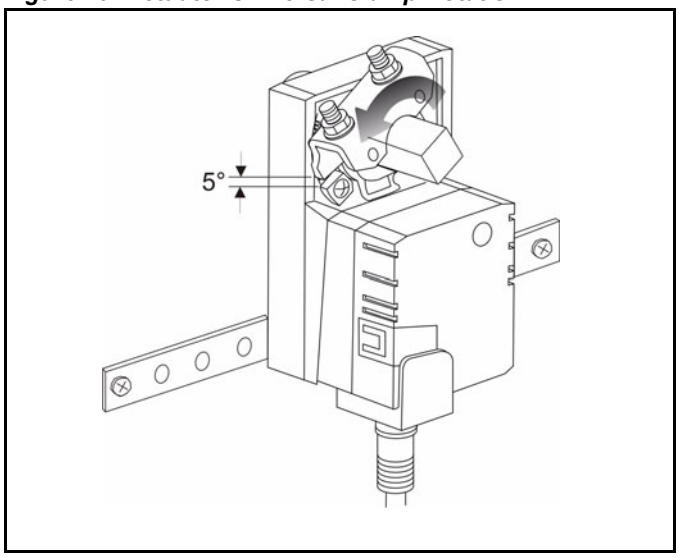
3. Disengage the actuator gear train by pressing the manual override button (Figure 9) and rotate the clamp until centered.

Figure 9: Actuator Manual Override Button and Strap



4. Slide the anti-rotation strap (Figure 9) under the actuator so it engages the actuator at the center of the actuator cut out (located on the back side). Bend the bracket as needed to support the back side of the actuator. Secure the strap/actuator to ductwork with self-tapping screws (#8 recommended).
5. Loosen the nuts on the universal clamp. Press the manual override button and rotate the clamp to about 5° (Figure 10) from the closed position (1/16" to 1/8" between stop and clamp).

Figure 10: Actuator Universal Clamp Rotation



6. Tighten the two nuts on the universal clamp with a wrench.

Reversing the Coil Handing

Coil connections can be switched to the opposite side of the unit by rotating the coil(s) 180 degrees side to side and reworking the coil section panel on the opposite side of the air handler.

Note: Direct expansion (DX) coils require 180 degree rotation on the top to bottom to locate distributor tubes at the leaving face of the coil.

⚠ CAUTION

Sharp edges and coil surfaces can cause personal injury. Avoid contact with them.

⚠ ATTENTION

Les bords tranchants et les surfaces des bobines sont un risque de blessure. Ne les touchez pas.

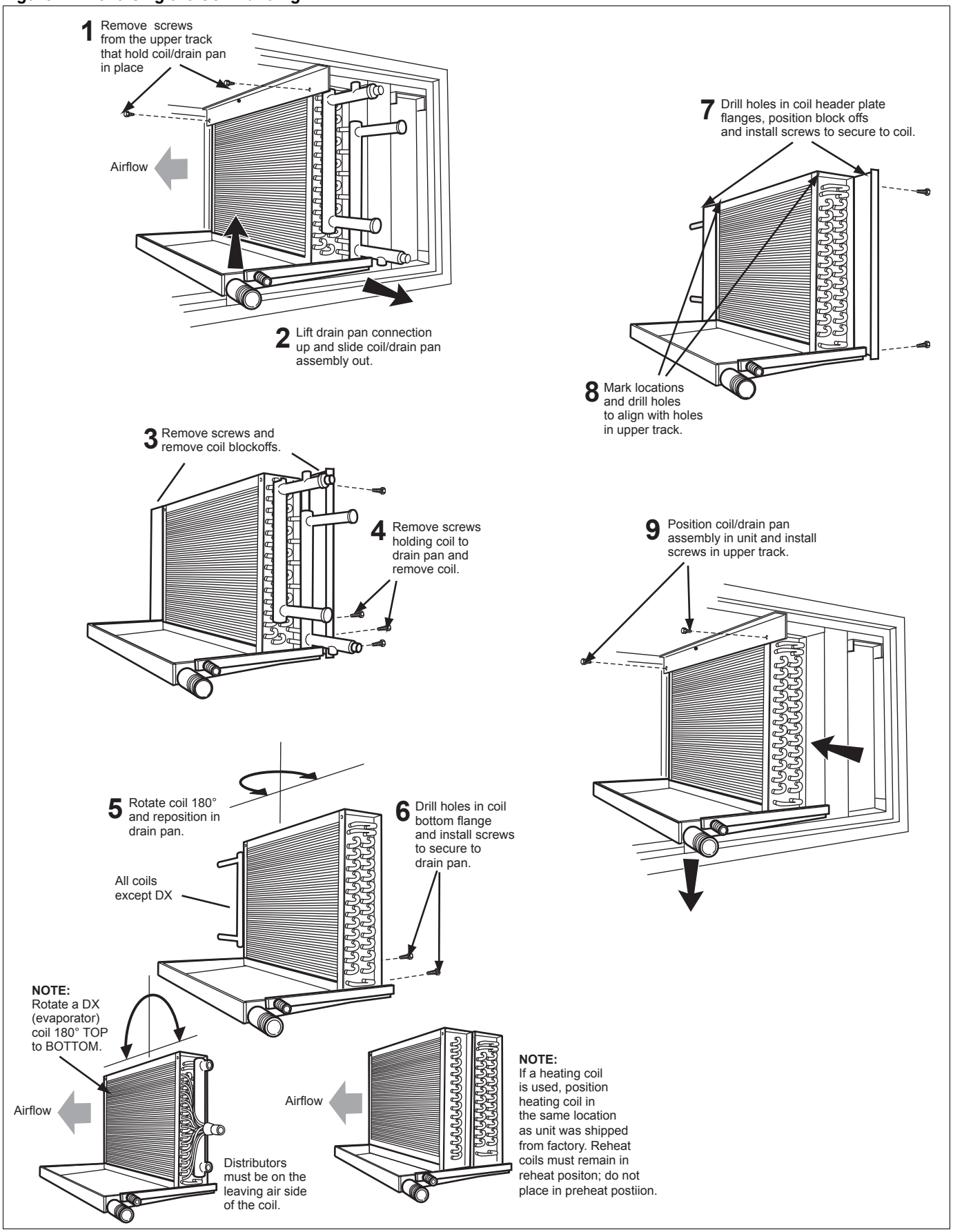
To reverse the coil connections, follow the steps below, referring to Figure 7 on page 10.

1. Remove exterior panels from both sides of the coil section. Remove screws that secure the top of the leaving coil face to the upper track on the inside top of the unit.
2. Lift drain pan condensate connection above the unit frame flange and slide drain pan, coil(s) and baffles out of unit.
3. Remove screws and remove coil blockoffs.
4. Remove screws holding coil to drain pan and remove coil.
5. Rotate the coil 180° and reposition coil blockoffs to the entering air side of the coil.
6. Drill holes if required and fasten the blockoffs to the entering side of the coil.
7. If unit has both heating and cooling coils, position and bolt heating coil and cooling coil casings together in same arrangement in the direction of airflow as unit was shipped from factory. Reheat coils must remain in reheat position; do not place in preheat position. Fasten the first coil in the air stream to the entering side of the drain pan using the same holes provided for the coil before it was rotated.
8. Mark locations and drill holes to align with holes in upper track.
9. Slide the coil, blockoffs and drain pan assembly back into unit the same way it was removed. Check the installation for an airtight fit. Re-install screws that secure the top of the leaving coil face to the upper track on the inside top of the unit.

Depending on whether the air handler was purchased from stock or if it was manufactured for the specific job, the panel on the opposite side may or may not have predrilled connection holes.

1. If connection holes need to be drilled, determine the proper diameter in order to use the existing grommets.
2. Mark connection locations on panel and drill new holes to accommodate connections and grommets.
3. Plug and seal unused connection holes on opposite side panel with new solid grommet or other suitable material.

Figure 11: Reversing the Coil Handing


1 Remove screws from the upper track that hold coil/drain pan in place
Airflow
2 Lift drain pan connection up and slide coil/drain pan assembly out.
7 Drill holes in coil header plate flanges, position block offs and install screws to secure to coil.
8 Mark locations and drill holes to align with holes in upper track.
3 Remove screws and remove coil blockoffs.
4 Remove screws holding coil to drain pan and remove coil.
9 Position coil/drain pan assembly in unit and install screws in upper track.
5 Rotate coil 180° and reposition in drain pan.
6 Drill holes in coil bottom flange and install screws to secure to drain pan.
All coils except DX
NOTE: Rotate a DX (evaporator) coil 180° TOP to BOTTOM.
Airflow
Distributors must be on the leaving air side of the coil.
Airflow
NOTE: If a heating coil is used, position heating coil in the same location as unit was shipped from factory. Reheat coils must remain in reheat positon; do not place in preheat postiion.

Reversing the Drive Package

A motor side or "hand" is determined by looking in the direction of air flow with the air contacting the back of the head. The drive package on the air handler can be changed to the other side of the blower. The motor base and motor are attached to back of the fan housing. They can be removed, rotated 180 degrees, and reattached. The fan sheave can be removed and reinstalled on the opposite end of the shaft (Figure 12). Review "Fan Drive Belt Adjustment" on page 28 when reinstalling the belts.

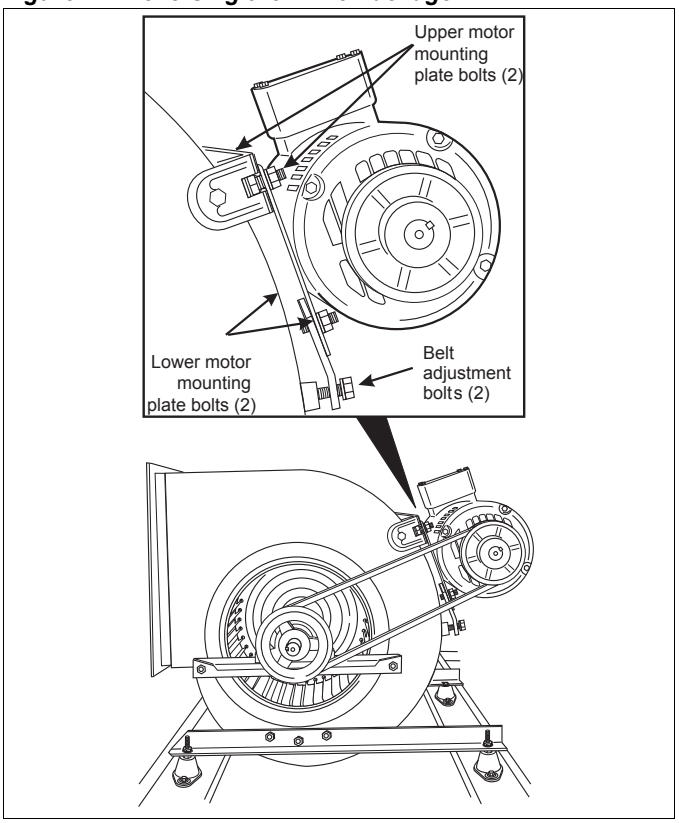
To reverse the drive package:

1. Loosen the belt adjustment screws to relieve the drive belt tension.
2. Remove the drive belt and the blower pulley.
3. Loosen the two upper bolts on the motor mounting plate and slide the motor out from the blower housing mount.
4. Move the top motor mounting bolts to the bottom motor mounting plate location and vice versa. Fasten securely.
5. Turn the motor 180° and slide it back into the blower housing mount and tighten bolts.

Note: Change the motor wiring so the motor rotates in the opposite direction.

1. Install the blower pulley and the belt to the other side of the blower housing.
2. Adjust belt tension.

Figure 12: Reversing the Drive Package



Hanging the Unit from a Ceiling

Before hanging, rig and completely assemble the unit.

⚠ WARNING

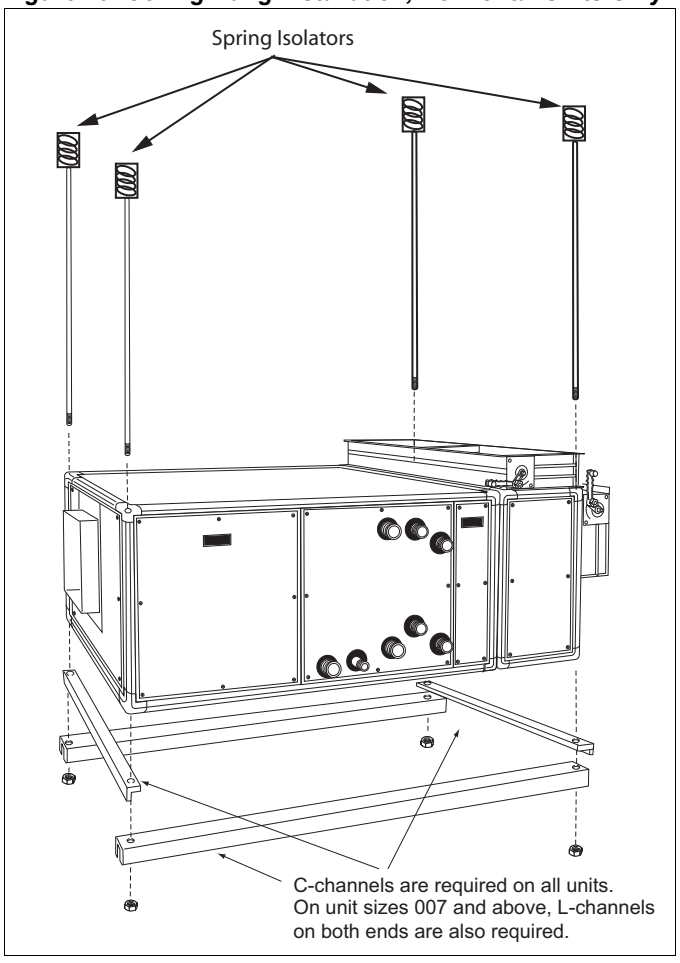
Do not suspend the unit from the top. The unit top will not support the weight of the unit. Equipment damage and severe personal injury can result.

⚠ AVERTISSEMENT

Ne pas suspendre l'unité par le toit. Le dessus de l'unité ne supportera pas le poids de l'unité. Ceci pourrait entraîner des dommages à l'unité ou des blessures personnelles graves.

The Destiny air handler has circular knockouts on the corner connections. Remove the knockouts and suspend the unit using threaded rods and hardware with required C-channels on both sides as shown in Figure 9. On unit sizes 007 and larger, L-channels are required on both ends in addition to C-channels. For 002 - 010 sized ceiling hung units, spring isolation of the cabinet is recommended. See Figure 9.

Figure 13: Ceiling Hung Installation, Horizontal Units Only


Spring Isolators
C-channels are required on all units.
On unit sizes 007 and above, L-channels
on both ends are also required.

Piping and Coils

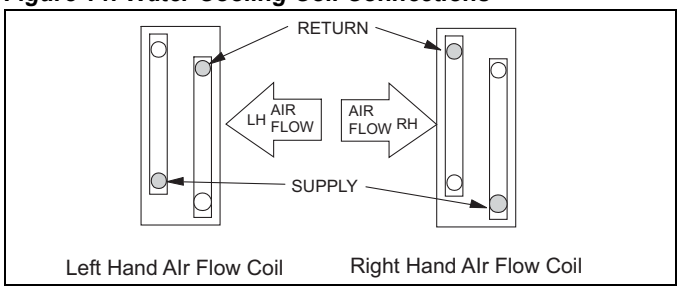
Follow applicable piping design, sizing, and installation information presented in ASHRAE Handbooks in the design and installation of piping. Observe all local codes and industry standards. Do not apply undue stress at the connection to the coil headers. Support pipe work independently of the coils.

Water Cooling Coils

Water cooling coil guidelines are listed below. Refer to Figure 10.

1. Water supply, water return, drain, and vent connections extend through the end panel of the coil section. All connections are labeled on the end panel.
2. Water supply and water return connections are copper sweat on units 002 through 010 and male NPT iron pipe on units 015 through 030.
3. When installing couplings, do not apply undue stress to the connection extending through unit panel. **Use a backup pipe wrench to avoid breaking the weld between coil connection and header.**
4. Follow recommendations of the control manufacturer regarding types, sizing, and installation of controls.

Figure 14: Water Cooling Coil Connections

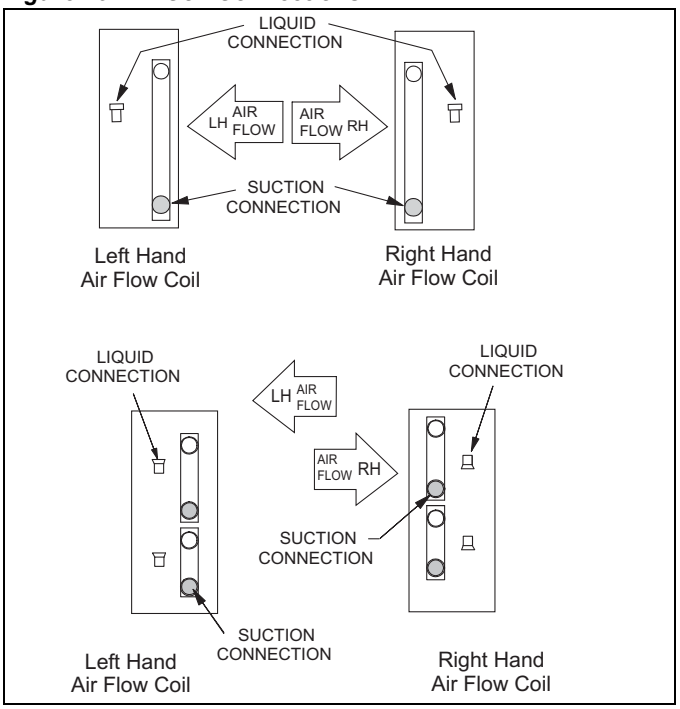


Direct Expansion Coils

Direct expansion coil connection guidelines are listed below. Refer to Figure 11.

1. The coil distributor and suction connection extend through the end panel of the coil section.
2. Check nozzle in distributor for proper tonnage.
3. The thermostat expansion valve must be an external equalizer tube type. Connect the equalizer tube provided on the coil (3/16" for units 002 to 010, and 1/4" for units 015 to 030) to the connection on the expansion valve.
4. Use care when piping up the system, making sure all joints are tight and all lines are dry and free of foreign material. For typical refrigerant piping, see the condensing unit product manual.

Figure 15: DX Coil Connections



Steam Coils (provided as Specials only)

Steam coil connection guidelines are listed below. Refer to Figure 12.

1. All steam coils in units are pitched toward the return connection.
2. Steam supply and steam return connections are typically male NPT iron pipe and are labeled on the end panel of coil section. Connections extend through coil section end panel.
3. When installing couplings, do not apply undue stress to the connection extending through unit panel. Use a backup pipe wrench to avoid breaking the weld between coil connection and header.
4. Support piping independently of coils and provide adequate piping flexibility. Stresses resulting from expansion of closely coupled piping can cause serious damage.
5. Do not reduce pipe size at the coil return connection. Carry return connection size through the dirt pocket, making the reduction at the branch leading to the trap.
6. Install vacuum breakers on all applications to prevent retaining condensate in the coil. Connect the vacuum breaker between the coil inlet and the return main.
7. Do not drip supply mains through the coil.
8. Do not attempt to lift condensate when using modulating or on/off control.
9. Size traps in accordance with manufacturers' recommendations. Be certain the required pressure differential will always be available. Do not undersize.

10 Use float and thermostatic or bucket traps with low pressure steam. On high pressure steam, use bucket traps. Use thermostatic traps only for air venting.

11 Use bucket traps only with on/off control.

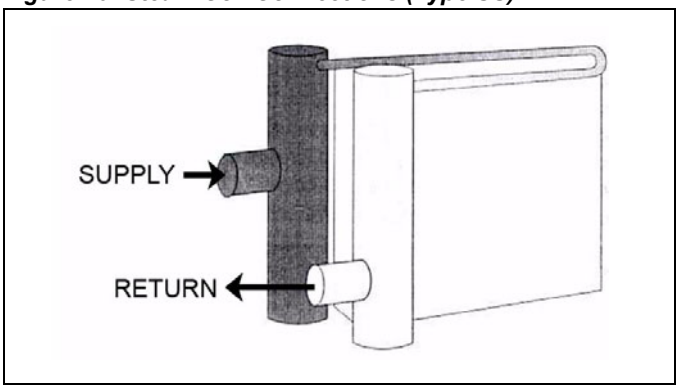
12 Locate traps at least 12 inches below the coil return connection.

13 Do not use modulating steam valves on high pressure systems.

14 Size modulating valves properly. Do not undersize.

15 Destiny steam coils are not recommended for freezing conditions or entering temperatures below 35°F (1.6°C).

Figure 16: Steam Coil Connections (Type SS)



Water Heating Coils

Heating coil connection guidelines are listed below. Refer to Figures 13 and 14.

1 Water supply and water return connections extend through the end panel of the coil section. All connections are labeled on the end panel.

2 Water supply and water return connections are copper sweat on units 002 through 010 and male NPT iron pipe on units 015 through 030.

3 When installing couplings, do not apply undue stress to the connection extending through unit panel. Use a backup pipe wrench to avoid breaking the weld between coil connection and header.

4 Follow recommendations of the control manufacturer regarding types, sizes, and installation of controls.

5 Hot water coils are not recommended for use with entering air below 40°F.

6 If fresh air and return air are to be heated by a hot water coil, take care in the design of the system to provide thorough mixing before air enters the coil.

Figure 17: Water Heating Coil Connections

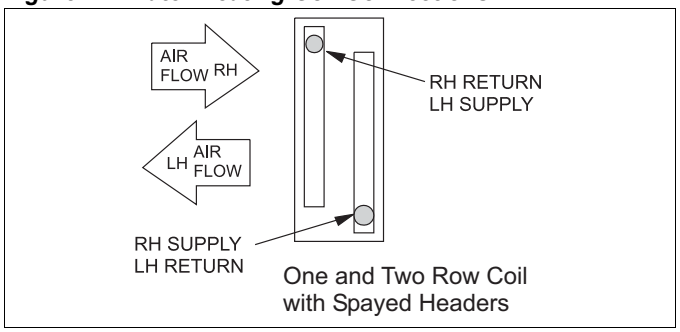
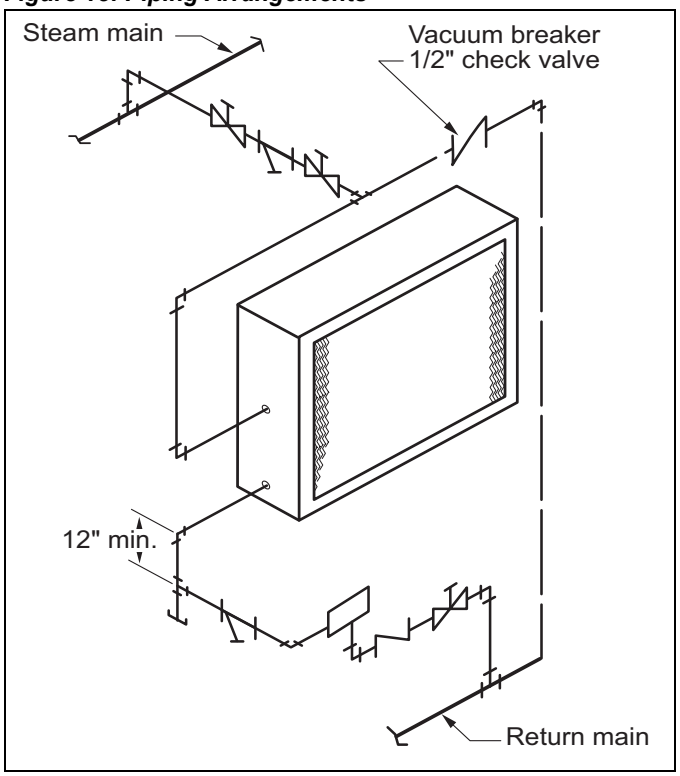


Figure 18: Piping Arrangements

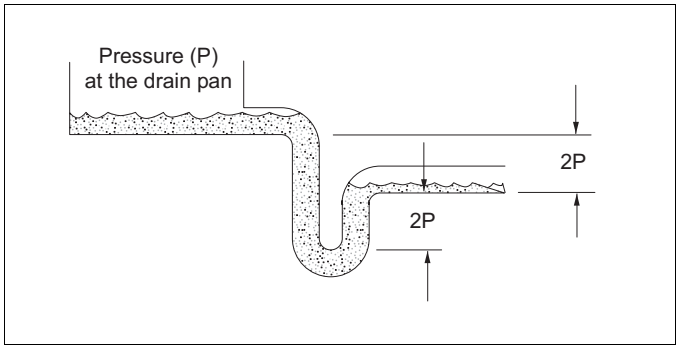


Drain Pan Traps

Destiny air handlers have a drain pan connection on both sides of the unit. Drain connections can be made on either side or both sides. Drain lines and traps should run full size from the drain pan connection. Drain pans should have traps to allow condensate from coils to drain freely. The trap depth and distance between the trap outlet and the drain pan outlet should be twice the static pressure in the drain pan section under normal operation for the trap to remain sealed. See Figure 15.

A secondary drain connection on the drain pan is standard on all Destiny units. Secondary drain connections are required in some applications as a visual means of identifying clogged primary drain lines.

Figure 19: Allow Adequate Distance Between Trap Outlet and Drain Outlet



Note: The door panels on some applications have a close clearance over the drain pipes. Extend the drain fitting with a coupling if necessary for door clearance.

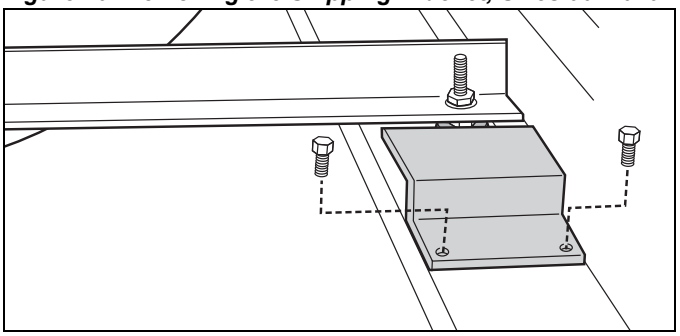
Internal Isolation Assembly Adjustment

Units have internally isolated fan and motor assemblies that are secured with brackets for shipment.

Before Operating the Unit

Remove the shipping bracket and bolts and discard. The shipping brackets located on the opposite drive side of the unit are difficult to access from the drive side of the unit. Either remove them before the unit is assembled, or remove the panel on the opposite drive side to gain access.

Figure 20: Removing the Shipping Bracket, Sizes 002–010



Spring Mount Adjustments—Twin Fan Units

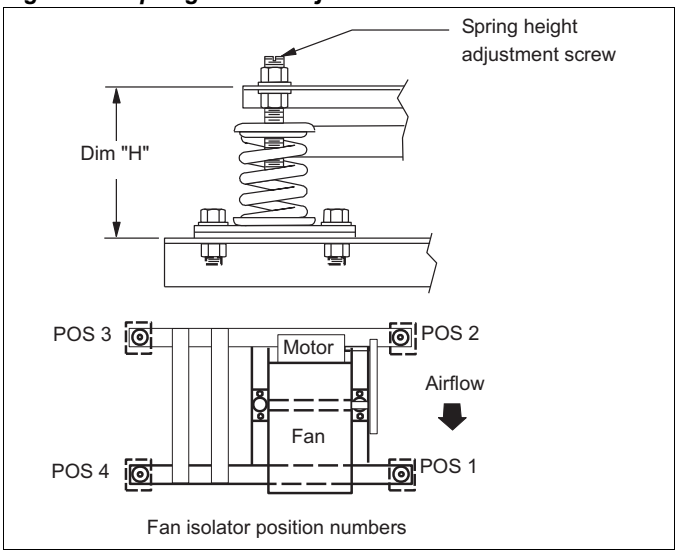
The spring isolators under the four corners of the fan and motor assembly have been factory adjusted while the fan was not running. See Table 1. With the unit operating at normal cfm and static pressure, the isolators should all be at the same height opening. If adjustments are required, loosen the 5/16" capscrew on top of the isolator and turn the adjusting bolt to lower or raise the fan and motor base. Retighten the capscrew when adjustments are completed. See Figure 17 below.

When seismic snubbers and/or thrust restraints are provided, no additional adjustments are required.

Table 1: Spring Mount Adjustment—Twin Fan Units

Spring mount adjustment at rest, unit sizes 015 to 030 ONLY			
Fan discharge position	**Top or bottom horizontal H**	**Downblast H**	**Upblast H**
1	3.75	3.75	4.25
2	4.25	3.75	4.25
3	4.25	3.75	4.25
4	3.75	3.75	4.25

Figure 21: Spring Mount Adjustments—Twin Fan Units



Electric Heat Section (Optional)

Optional factory installed electric heat section consists of open coil duct heater mounted to the unit at the supply fan discharge. Heat section includes heating coils and an electrical control box with single point field power connection for heater and supply air fan.

Factory provided field knockouts are located on the side of the electric heat control panel for field power and control wiring to pass through. A factory installed non-fused disconnect is located in the electric heat control panel to disconnect power to the supply air fan and heater components. All wiring must be in conformance with the national electric code and local restrictions.

Open Coil Duct Heater

- Complete with overload and thermal protection
- Includes fan interlock and air flow switch safety protection
- High quality, alloy nichrome wire [80%Ni / 20%Cr]
- High di-electric level ceramic insulators
- Screw terminals

Single Point Power

- Non-fused disconnect
- Electric heat is factory wired including contactors and fuses per step and as required by UL. Refer to Figure and Figure 26 for typical electric heat wiring diagrams
- Fan motor is factory wired including contactor or starter and fuses as applicable
- Fused control transformer allows the heater and fan to be sequenced by standard 24 volt thermostat
- Indoor control panel with tool access hinged door houses all components

Quality Control

- Heaters are di-electrically tested for 1000V plus twice the rated volts, or 2000V whichever is greater. The resistance of each heater is measured and recorded and must be within 5% of the rated value
- Every heater is checked during the production process and as a final assembly

Figure 22: Heater Nomenclature

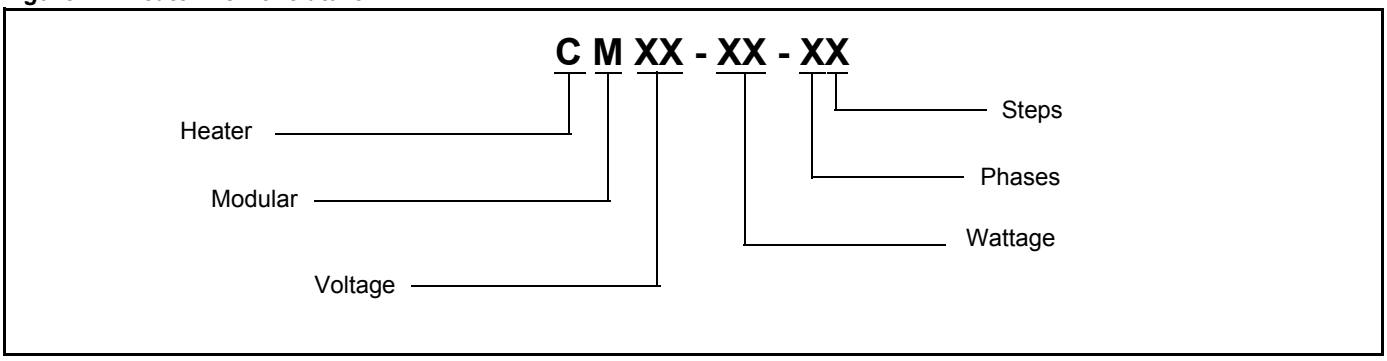
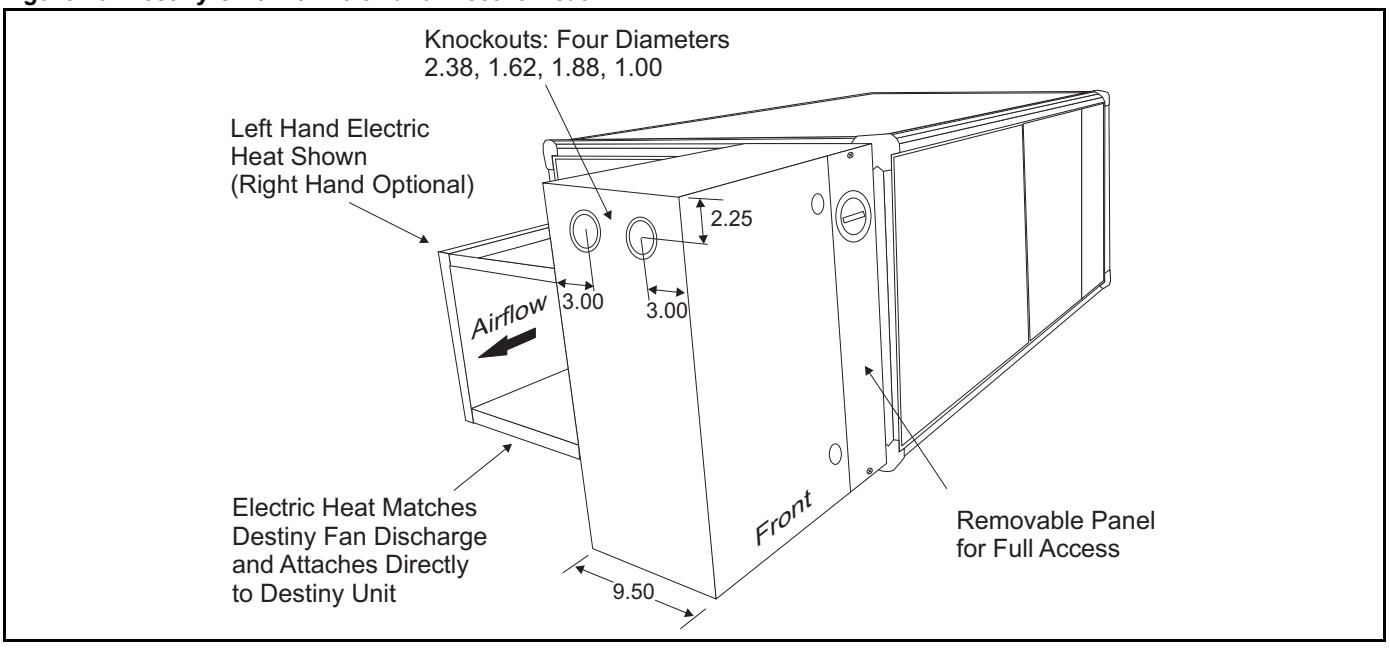


Figure 23: Destiny Unit with Left Hand Electric Heat



Electric Heat kW Options

Table 2: KW Options by Unit Size

	Unit Size					
	002	**003**	**004**	**005**	**007**	**010**
KW Range	1.5 - 10	2.5 - 20	2.5 - 20	4 - 26	6 - 38	6 - 55

Heater Amps

Table 3: Heater Amps

		KW												
Voltage	**Phase**	**1**	**1.5**	**2**	**2.5**	**3**	**3.5**	**4**	**4.5**	**5**	**5.5**	**6**	**6.5**	**7**
120	**1**	8.33	12.50	16.67	20.83	25.00	29.17	33.33	37.50	41.67	45.83	50.00	54.17	58.33
240	**1**	4.17	6.25	8.33	10.42	12.50	14.58	16.67	18.75	20.83	22.92	25.00	27.08	29.17
240	**3**	2.41	3.61	4.82	6.02	7.23	8.43	9.63	10.84	12.04	13.25	14.45	15.66	16.86
480	**3**	1.20	1.81	2.41	3.01	3.61	4.21	4.82	5.42	6.02	6.62	7.23	7.83	8.43
600	**3**	0.96	1.45	1.93	2.41	2.89	3.37	3.85	4.34	4.82	5.30	5.78	6.26	6.74

		KW											
Voltage	**Phase**	**7.5**	**8**	**8.5**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
120	**1**	62.50	66.67	70.83	75.00	83.33	91.67	100.00	108.33	116.67	125.00	133.33	141.67
240	**1**	31.25	33.33	35.42	37.50	41.67	45.83	50.00	54.17	58.33	62.50	66.67	70.83
240	**3**	18.06	19.27	20.47	21.68	24.08	26.49	28.90	31.31	33.72	36.13	38.54	40.94
480	**3**	9.03	9.63	10.24	10.84	12.04	13.25	14.45	15.66	16.86	18.06	19.27	20.47
600	**3**	7.23	7.71	8.19	8.67	9.63	10.60	11.56	12.52	13.49	14.45	15.41	16.38

		KW											
Voltage	**Phase**	**18**	**19**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**38**
120	**1**	150.00	158.33	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
240	**1**	75.00	79.17	83.33	91.67	100.00	108.33	116.67	125.00	133.33	141.67	150.00	158.33
240	**3**	43.35	45.76	48.17	52.99	57.80	62.62	67.44	72.25	77.07	81.89	86.71	91.52
480	**3**	21.68	22.88	24.08	26.49	28.90	31.31	33.72	36.13	38.54	40.94	43.35	45.76
600	**3**	17.34	18.30	19.27	21.19	23.12	25.05	26.97	28.90	30.83	32.76	34.68	36.61

		KW			
Voltage	**Phase**	**40**	**45**	**50**	**55**
120	**1**	N/A	N/A	N/A	N/A
240	**1**	N/A	N/A	N/A	N/A
240	**3**	96.34	108.38	120.42	132.47
480	**3**	48.17	54.19	60.21	66.23
600	**3**	38.54	43.35	48.17	52.99

Electric Heat Safety

Overcurrent Protection

Overcurrent fuse protection is provided for each stage of electric heat (in lieu of one per 48 amperes).

Thermal (Over Temperature) Protection

Primary - Automatic limit switches, one per step (120°F or 150°F as appropriate).

Backup - Manual reset thermal cutout (180°F).

Fan Interlock Method:

To prevent the heater from being energized unless the fan is on, the heater includes two interlock methods: an airflow switch, and the use of an auxiliary contact in the motor starter contactor (3ph) or a fan relay (1ph).

Airflow Switch:

The airflow switch provides the best means of protection against air failure caused by fan belt or other malfunction. Switches are of the differential pressure, diaphragm-operated type and require a minimum total pressure differential of .05" WC. The switch is factory wired in series with the manual reset cutout.

Minimum Air Velocity

Recommended minimum air flow through a specific heater is shown in the following tables.

Table 4: LAH002 Minimum Air Velocity

Heater Capacity, kW	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5
Minimum air flow, CFM	184	218	249	274	292	310	328	344	359	371	382	387	398	396	400
Heater Capacity, kW	**9**	**10**													
Minimum air flow, CFM	404	409													

Table 5: LAH003 Minimum Air Velocity

Heater Capacity, kW	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	10
Minimum air flow, CFM	298	339	368	400	426	446	466	484	501	519	536	550	565	579	605
Heater Capacity, kW	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**					
Minimum air flow, CFM	620	629	637	646	652	658	660	660	663	663					

Table 6: LAH004 Minimum Air Velocity

Heater Capacity, kW	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	10
Minimum air flow, CFM	298	339	368	400	426	446	466	484	501	519	536	550	565	579	605
	11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**					
Minimum air flow, CFM	620	629	637	646	652	658	660	660	663	663					

Table 7: LAH005 Minimum Air Velocity

Heater Capacity, kW	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	10	11	12	13
Minimum air flow, CFM	447	477	511	538	561	584	603	622	641	656	672	706	740	771	794
Heater Capacity, kW	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**22**	**24**	**26**					
Minimum air flow, CFM	809	824	832	840	847	855	859	866	870	874					

Table 8: LAH005 Minimum Air Velocity

Heater Capacity, kW	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	10	11	12	13
Minimum air flow, CFM	447	477	511	538	561	584	603	622	641	656	672	706	740	771	794
Heater Capacity, kW	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**22**	**24**	**26**					
Minimum air flow, CFM	809	824	832	840	847	855	859	866	870	874					

Table 9: LAH007 Minimum Air Velocity

Heater Capacity, kW	6	6.5	7	7.5	8	8.5	9	10	11	12	13	14	15	16	17
Minimum air flow, CFM	637	673	704	729	750	765	790	831	867	903	938	969	1000	1030	1056
Heater Capacity, kW	**18**	**19**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**38**			
Minimum air flow, CFM	1076	1096	1102	1117	1132	1142	1153	1163	1168	1168	1173	1173			

Table 10: LAH010 Minimum Air Velocity

Heater Capacity, kW	6	6.5	7	7.5	8	8.5	9	10	11	12	13	14	15	16	17
Minimum air flow, CFM	637	673	704	729	750	765	790	831	867	903	938	969	1000	1030	1056
Heater Capacity, kW	**18**	**19**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**38**	**40**	**45**	
Minimum air flow, CFM	1076	1096	1102	1117	1132	1142	1153	1163	1168	1168	1173	1173	1173	1178	

Electric Heat Operation

The sampling probe is suitable for left-hand or right-hand airflow and in positive pressure applications may require field adjustment so the probe faces upstream. This is normally done during installation by removing two screws, rotating the probe 180° and replacing the screws. Removing the heater from the duct is not necessary.

The electric heater is designed to operate while installed and connected to the unit at the supply air fan discharge, to heat air passing through the heating elements.

Temperature rise is very important and can be obtained using the following calculation:

Temperature Rise = $\frac{(KW)(3159)}{CFM}$

Note: Maximum leaving air temperature = 120°F

NOTICE

Heaters are furnished for zero clearance between the duct and combustible surfaces. However, it is not recommended that any combustible material be allowed to touch any electric duct heater or immediate surrounding areas.

NOTICE

Heaters are not intended to be installed with less than 20” of straight duct at the outlet of the heater.

NOTICE

Field wiring necessary temperatures are:
1) 194°F for dry weather.
2) 167°F for humid weather.

Field Power Wiring

⚠ WARNING

Improper grounding may result in severe injury or death. Check grounding nut tightness before connecting power to the external junction box.

⚠ AVERTISSEMENT

Une mise à la terre défaillante peut causer des blessures graves ou la mort. Vérifiez l’étanchéité des vis de mise à terre avant d’alimenter la boite de jonction externe.

Wiring must comply with all applicable codes and ordinances. The warranty is voided if wiring is not in accordance with these specifications. An open fuse or starter indicates a short, ground, or overload. Before replacing a fuse or resetting a starter, identify the trouble and correct.

According to the National Electrical Code, a disconnecting means shall be located within sight of and readily accessible from the air conditioning equipment. Power leads must be over-current protected at the point of distribution. The maximum allowable overcurrent protection (MROPD) appears on the unit nameplate.

⚠ WARNING

Hazardous voltage. Can cause severe injury or death. Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

⚠ AVERTISSEMENT

Haut voltage. Peut causer des blessures sévères ou la mort. Déconnectez la puissance électrique avant tous travaux de maintenance. Plus d’une déconnection peut être requis pour éteindre complètement l’unité.

Supply Power Wiring

1. Allowable voltage tolerances:
   - **a** 60 Hertz
     - – Nameplate 208V: Min. 187V, Max. 229V
     - – Nameplate 230V: Min. 207V, Max. 253V
     - – Nameplate 460V: Min. 414V, Max. 506V
     - – Nameplate 575V: Min. 518V, Max. 633V
   - **b** 50 Hertz
     - – Nameplate 380V: Min. 360V, Max. 418V
2. Minimum Circuit Ampacity (MCA) Calculation is based on the following formulas:
   - – Electric heat less than or equal to 50 kW
     MCA = 1.25 (heater FLA + largest motor loads) + (the rest of the loads)
   - – Electric heat greater than or equal to 50 kW
     MCA = 1.25 (largest motor load) + (the rest of the loads) + heater FLA
3. Size wires in accordance with Table 310-16 or 310-19 of the National Electrical Code.
4. Wires should be sized for a maximum of 3% voltage drop.

Electrical Installation

1. Electrical service to the fan must correspond to the rated voltage on the motor nameplate and be in conformance with the National Electric Code and local restrictions.
2. The fan section metal frame must be connected to the building electrical ground.
3. A door electrical interlock is not provided as standard.
4. Thermal motor protection is external to the unit. Unless the unit is provided with a unit mounted starter, thermal protection and a disconnect switch provision per electric codes are provided by others.
5. When the unit is factory provided with a junction box, disconnect switch, starter, or a variable frequency drive (VFD), the components are mounted on the outside of the unit cabinet. Factory wiring is provided from the device to the unit internal motor.

Variable Frequency Drive (VFD) - Optional

1. When the unit is provided with a VFD only, refer to the VFD manual for wire size and torque requirements. A fast-blow fused disconnect is recommended for VFD applications. Motor operation below 20 Hz is not recommended. For typical wiring diagrams, see Figure 29 and Figure 30.
2. Refer to OM 844-1 (MD2 drives) or OM 895 (MD3 drives) for VFD set-up details. The drives are installed with only default programming and are to be field configured to meet application requirements. Information on ATV11 drives may be found in VFD manufacturer's manuals.

⚠ WARNING

Fire hazard. Failure to use fast-blow J-type fuses could result in property damage, injury, or death. Fast-blow fuses must be installed upstream of a VFD.

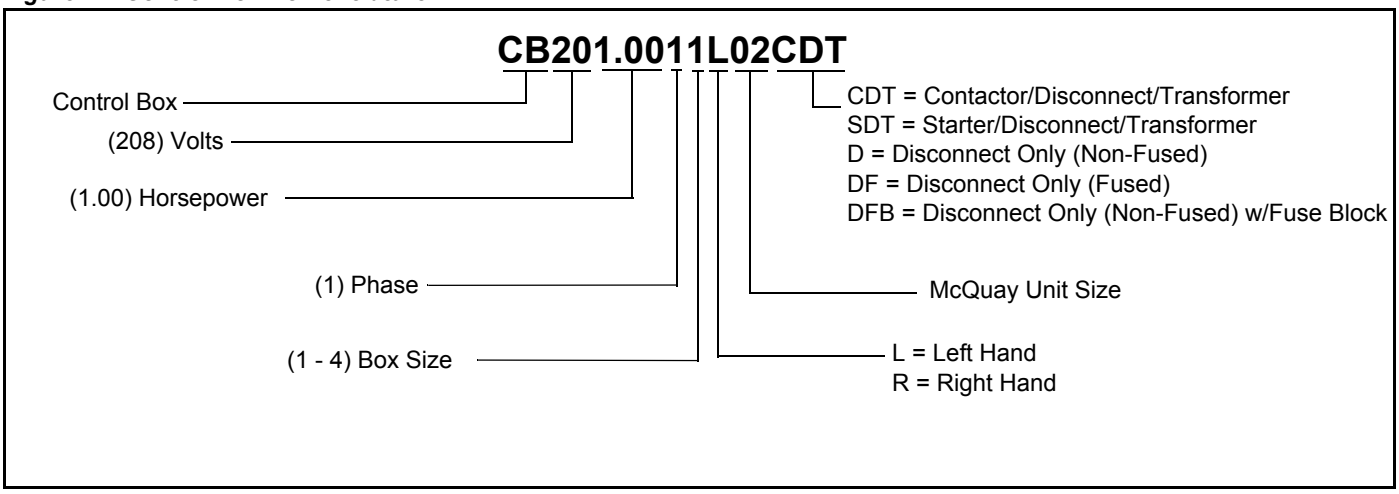
⚠ AVERTISSEMENT

Risques d'incendie. À défaut d'installer un sectionneur à fusible à action rapide de type J, cela peut entraîner des dommages à la propriété, des blessures ou la mort.
Un sectionneur à fusible à action rapide de type J doit être installé avant le variateur de fréquence

Starters and Disconnect - Optional

1. The fan motor is factory wired to an externally mounted control box. Control box options include: disconnect-only (fused and non-fused) and starter-fused disconnect transformer.
2. A fast-blow fused disconnect (J-type fuses) is used in VFD applications.
3. A fused control transformer allows the fan to be sequenced by standard 24-volt thermostat or controller.
4. An indoor panel with tool access hinged door houses all the components and is generally mounted on the unit's bulkhead panel. The panel enclosure has several knockouts located on the side, top, and bottom.
5. All field wiring must be in conformance with the National Electric Code and local restrictions.
6. Refer to Figure 27 and Figure 28 for typical disconnect-only wiring diagrams. Refer to Figure 33 and Figure 34 for typical full control box diagrams.

Figure 24: Control Box Nomenclature



Note: There are 16 total characters in the nomenclature description.
Other nomenclature examples:
CB120.3312L02-DF
CB120.3312L02DFB
CB5720.034R25SDT
CB5720.034R25--D

Electric Heat Diagrams

Figure 25: Typical 1-Phase, 240 Volt Electric Heat Wiring Diagram

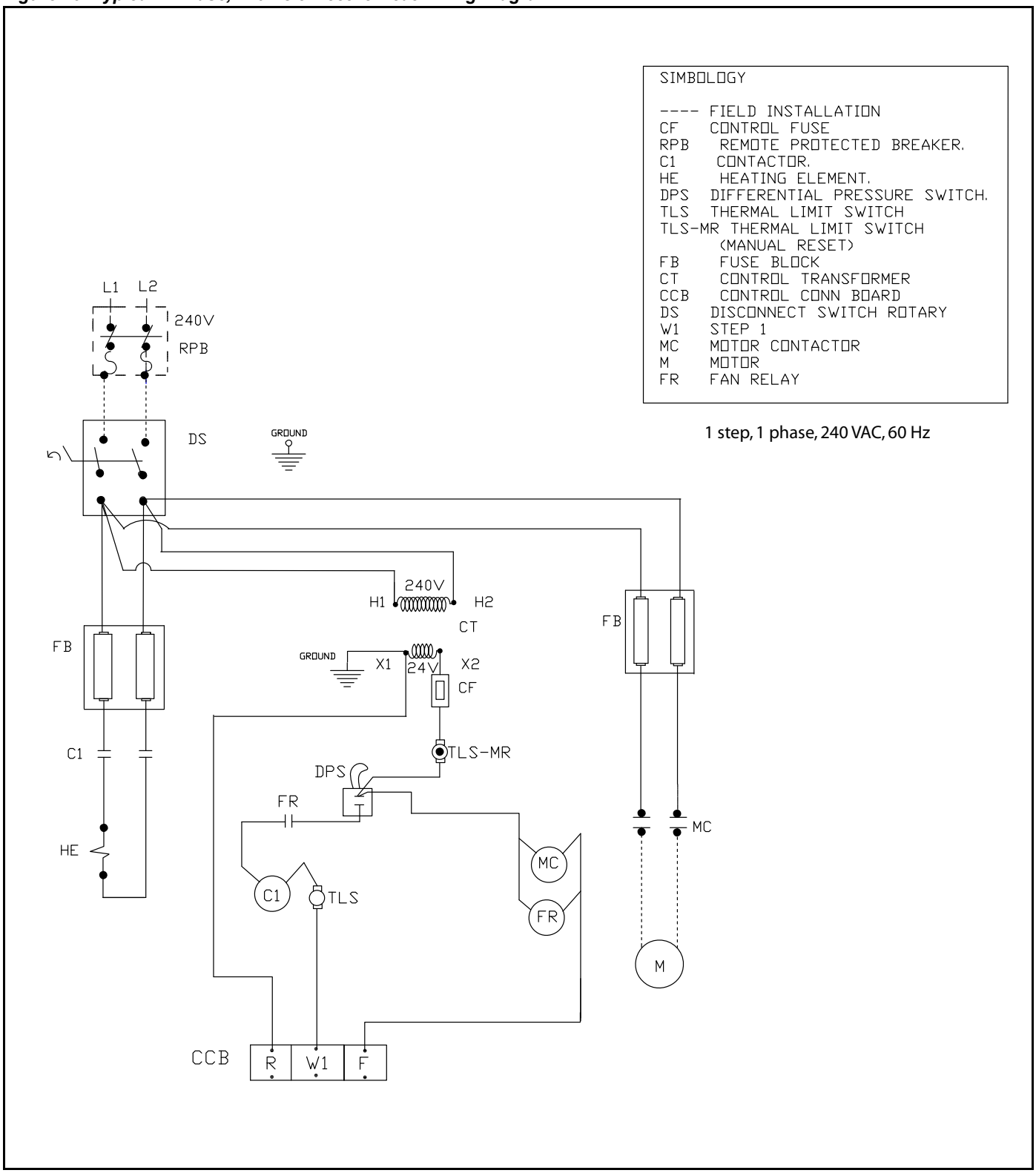
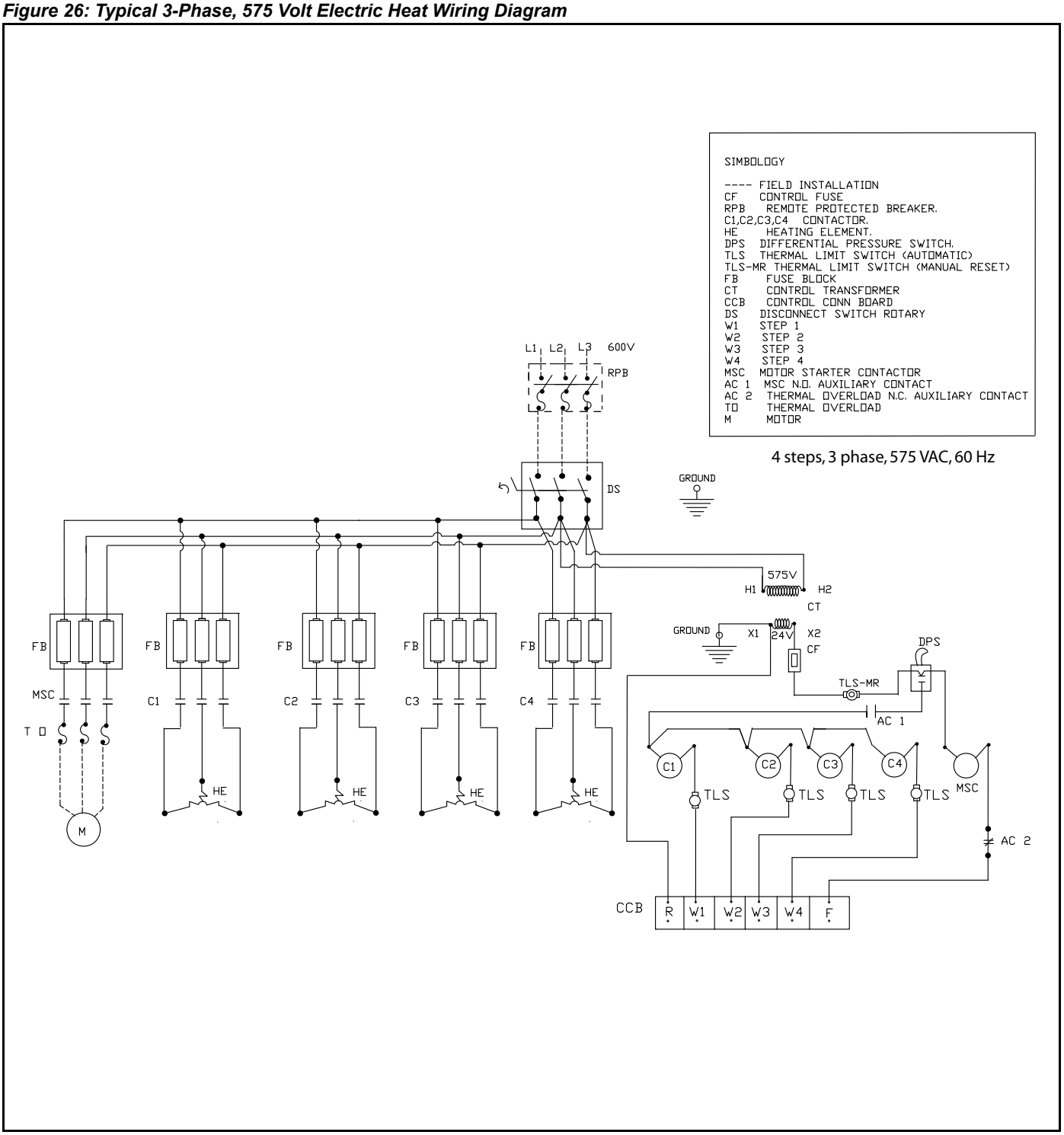


Figure 26: Typical 3-Phase, 575 Volt Electric Heat Wiring Diagram



Disconnect-Only Diagrams

Figure 27: Typical 1-Phase, 208 Volt Disconnect-Only Wiring Diagram

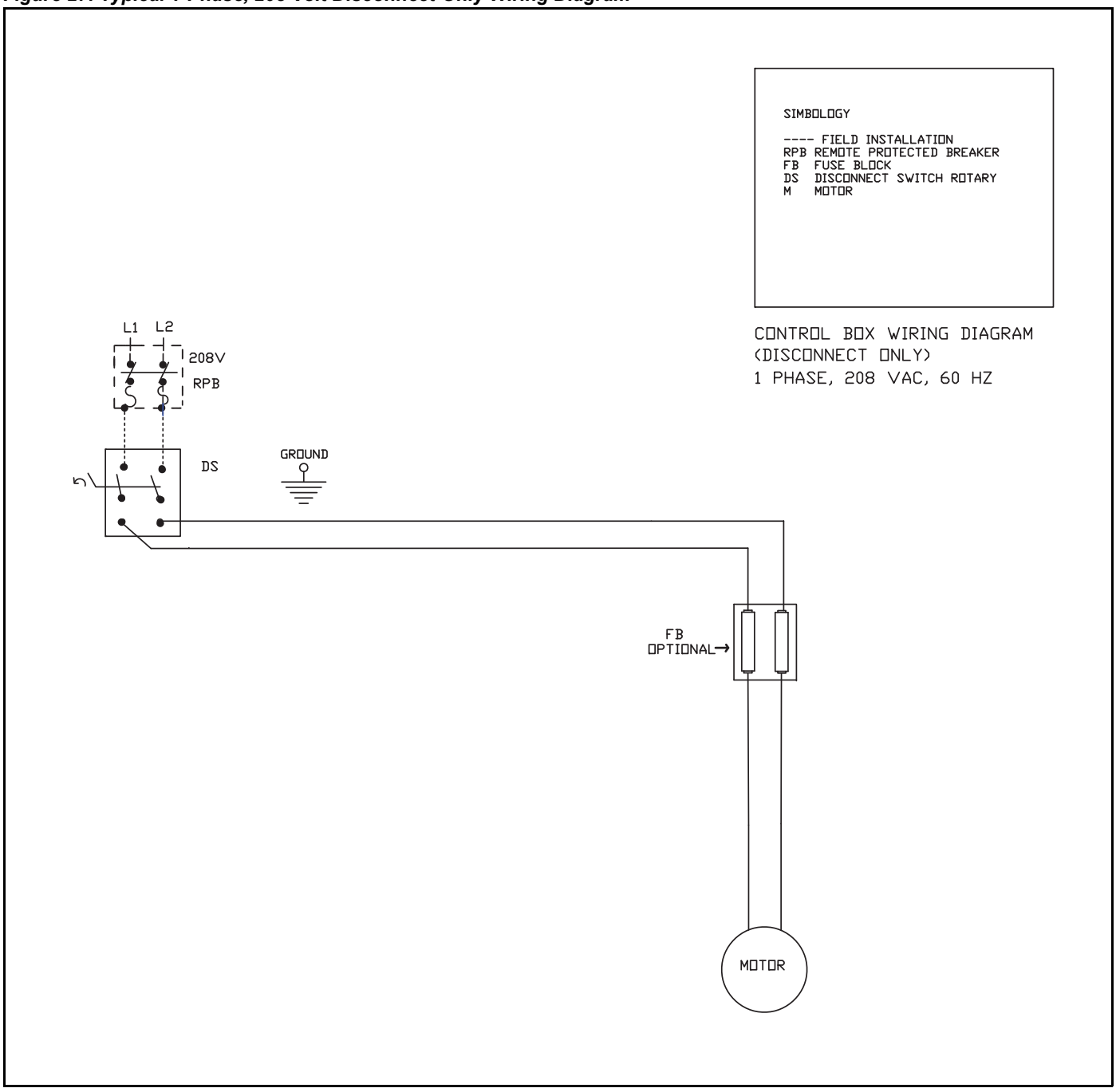
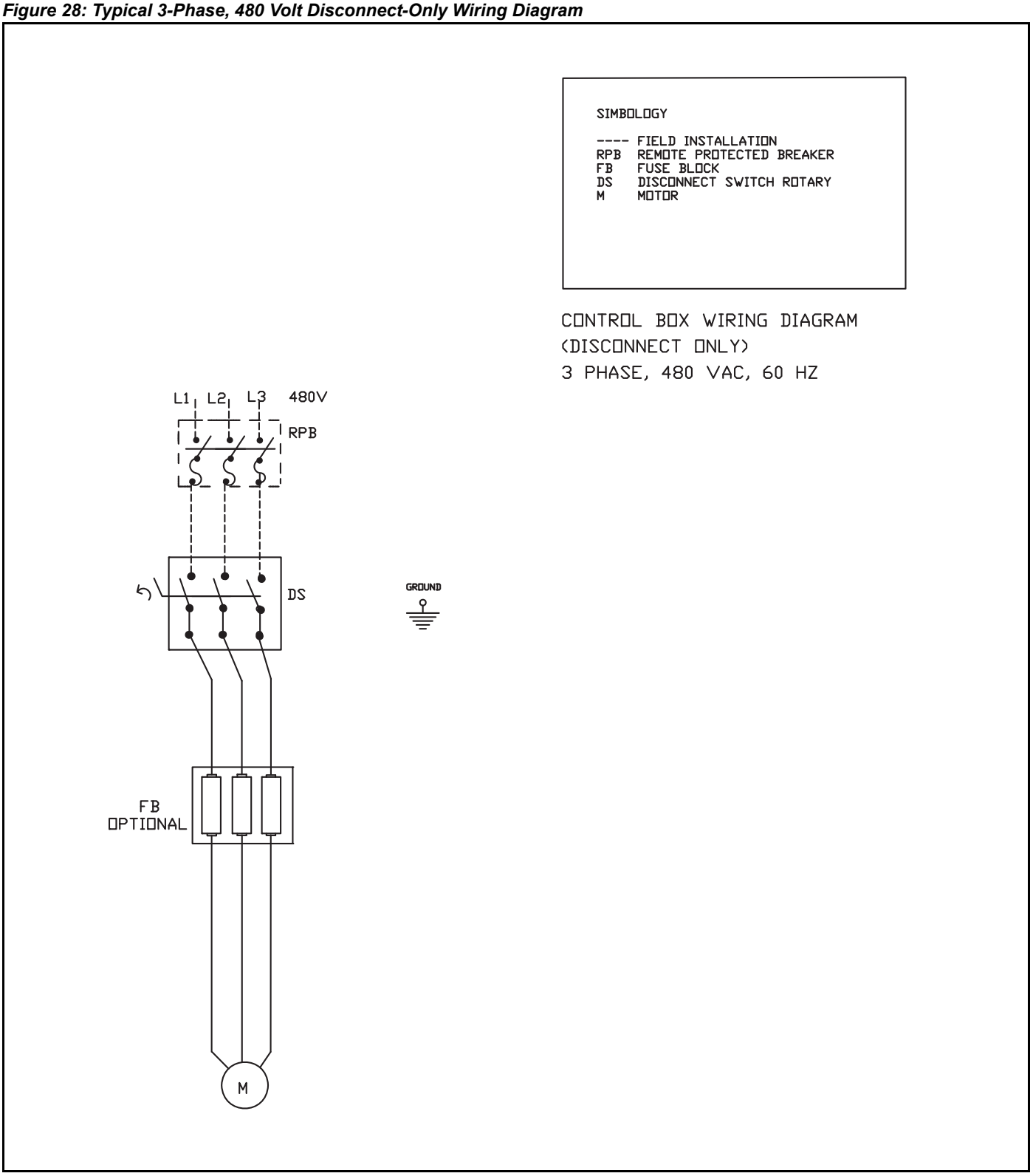


Figure 28: Typical 3-Phase, 480 Volt Disconnect-Only Wiring Diagram



VFD Diagrams

Figure 29: Typical MD2 VFD Wiring Diagram

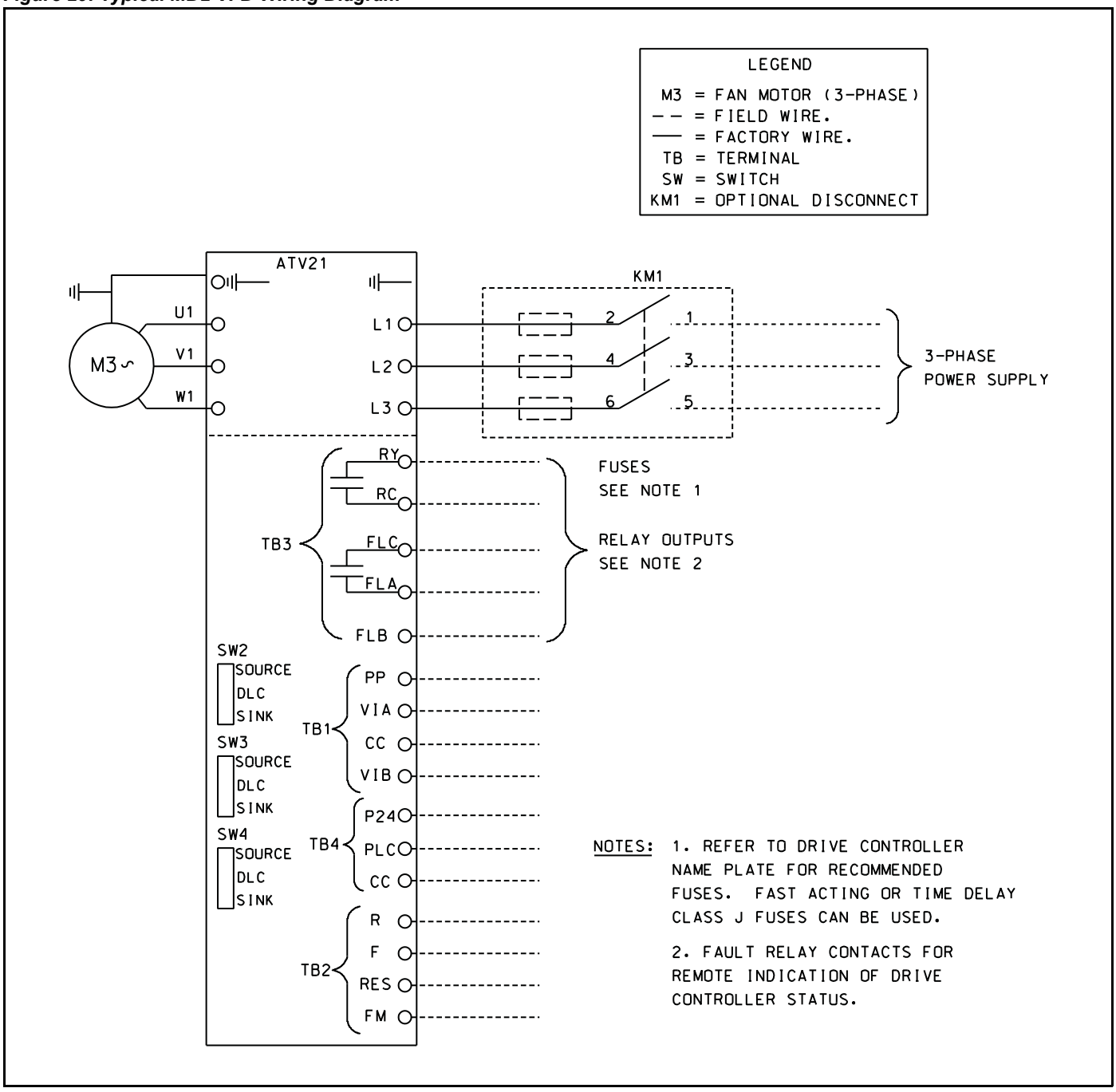


Figure 30: Typical MD3 VFD Wiring Diagram

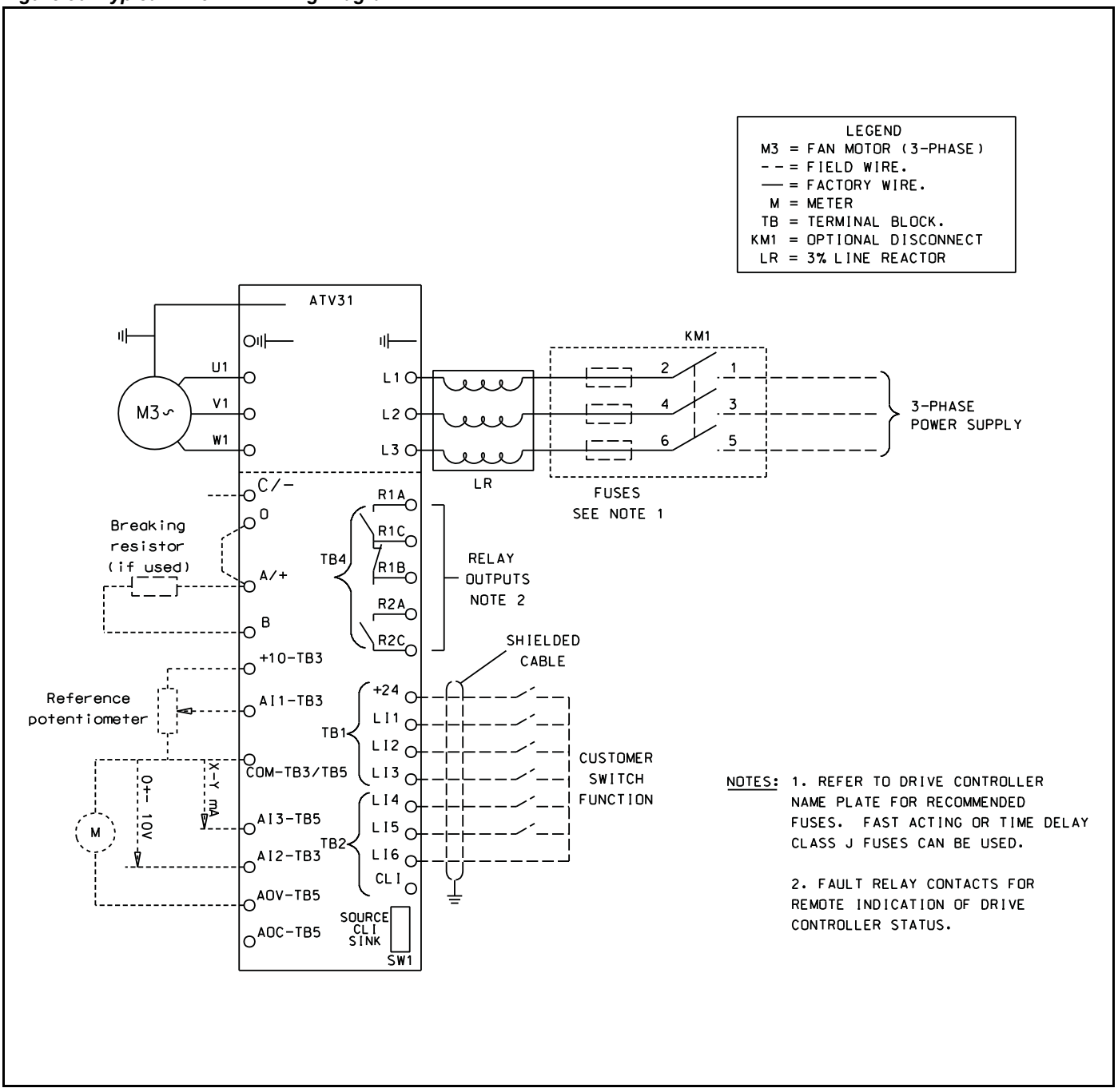


Figure 31: Typical 208 Volt Starter/Disconnect Wiring Diagram

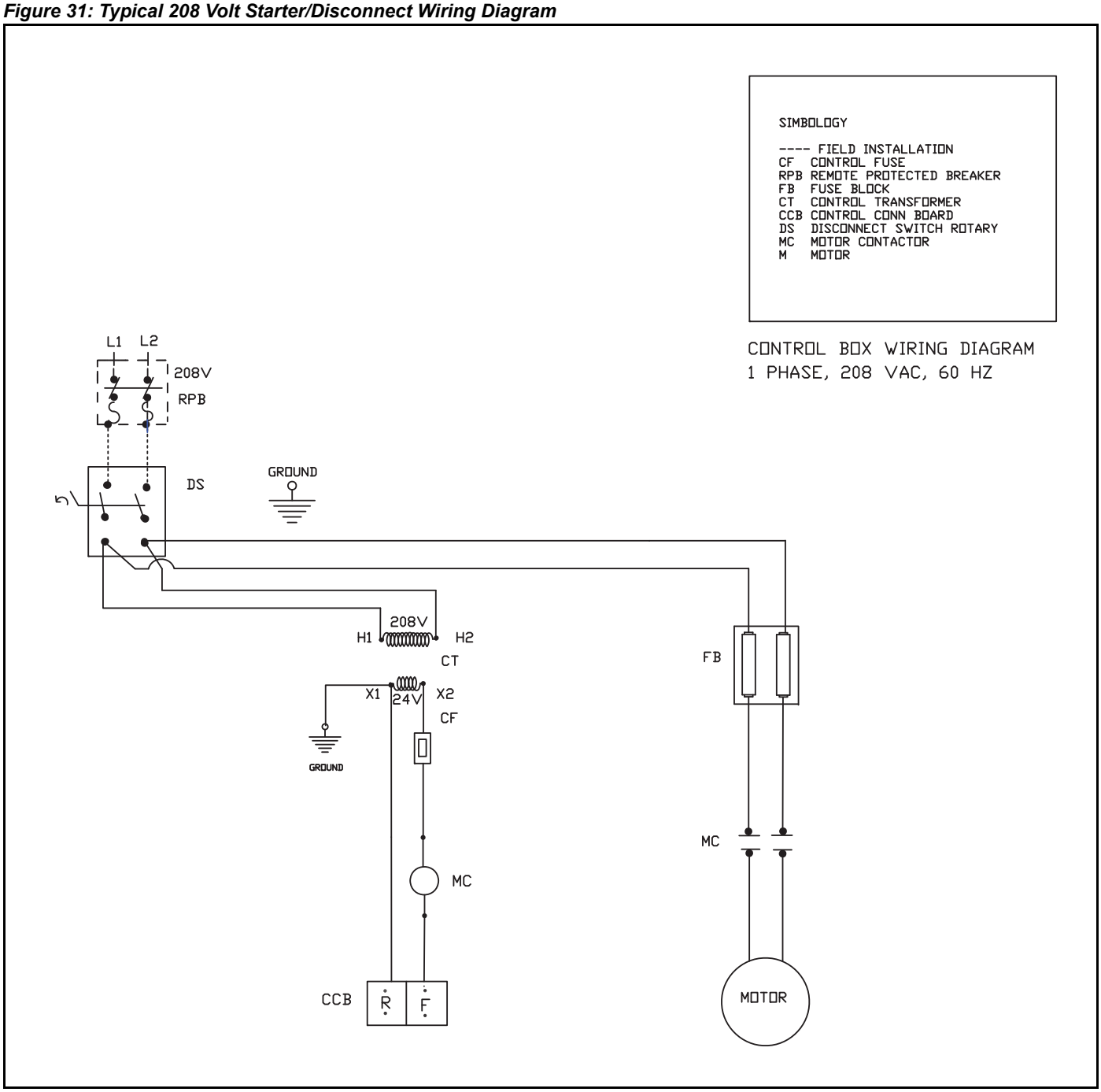
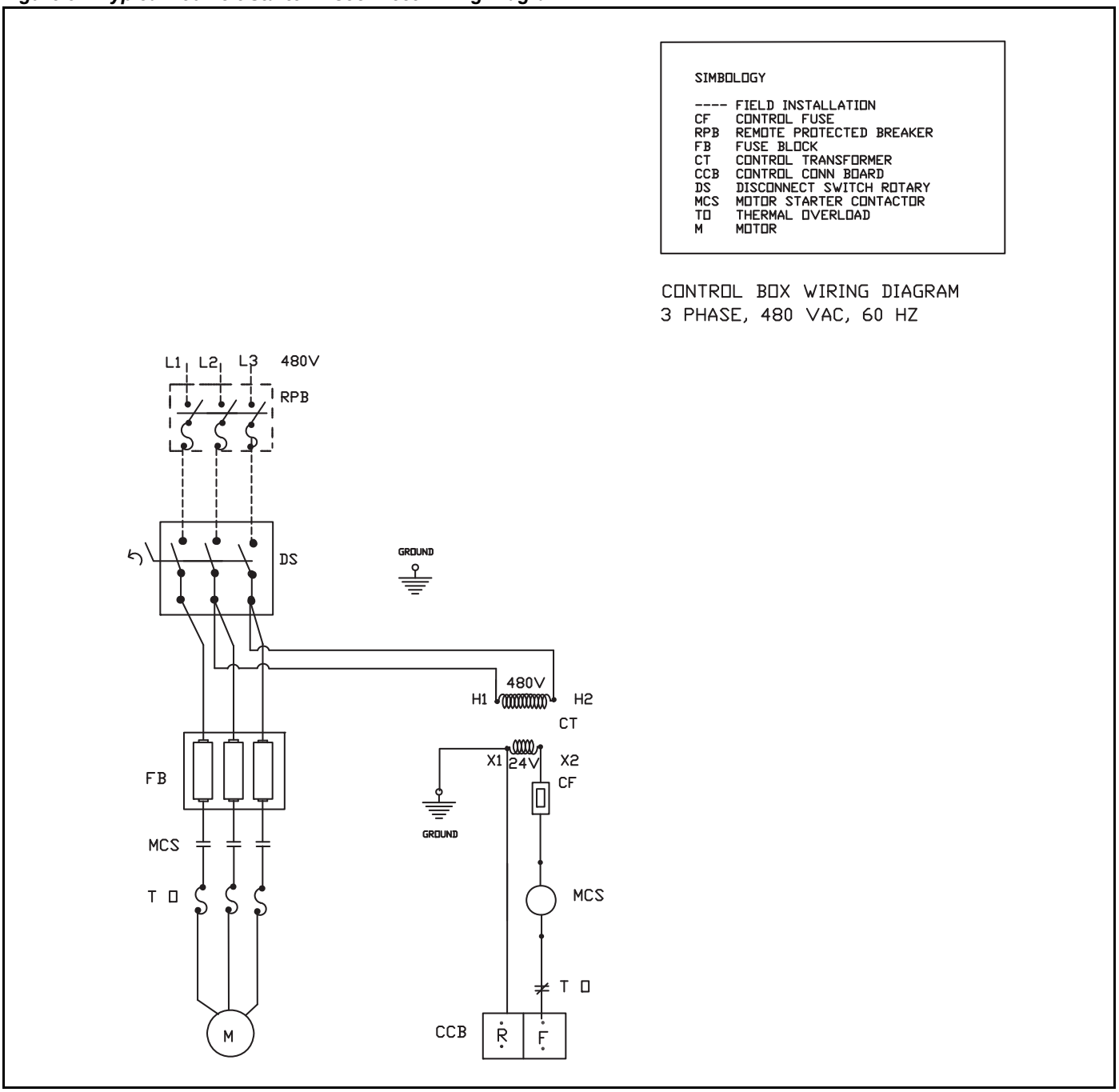


Figure 32: Typical 480 Volt Starter/Disconnect Wiring Diagram



Component and Section Weights

Table 11: Unit Coil Weights

Coil type	Weight—lbs (kg)									
	002	003	004	005	007	010	015	020	025	030
4-row chilled water	31.64 (14.35)	40.56 (18.40)	54.30 (24.64)	59.19 (26.85)	84.80 (38.46)	111.99 (50.80)	185.93 (84.34)	255.08 (115.70)	298.34 (135.32)	341.54 (154.92)
6-row chilled water	39.94 (18.12)	54.81 (24.86)	69.01 (31.30)	86.91 (39.42)	112.30 (50.94)	154.05 (69.88)	261.55 (118.64)	353.14 (160.18)	416.35 (188.85)	477.93 (216.79)
1-row hot water	16.11 (7.31)	19.95 (9.05)	28.36 (12.86)	33.60 (15.24)	45.86 (20.80)	66.07 (29.97)	91.35 (41.44)	116.29 (52.75)	132.03 (59.89)	168.86 (76.59)
2-row hot water	24.36 (11.05)	29.96 (13.59)	38.07 (17.27)	46.13 (20.92)	64.28 (29.16)	83.91 (38.06)	121.10 (54.93)	171.48 (77.78)	197.12 (89.41)	223.03 (101.16)
4-row DX	32.73 (14.85)	42.91 (19.46)	50.11 (22.73)	64.80 (29.39)	88.18 (40.00)	115.42 (52.35)	195.54 (88.70)	248.63 (112.78)	300.8 (136.44)	344.86 (156.43)
6-row DX	43.37 (19.67)	57.01 (25.86)	71.53 (32.45)	91.69 (41.59)	105.18 (47.71)	158.52 (71.90)	268.37 (121.73)	365.31 (165.71)	429.85 (194.98)	493.24 (223.73)

Table 12: Base Unit Cabinet Weights—Horizontal Unit

Unit size	Weight—lbs (kg)									
	Configuration		Configuration		Configuration		Configuration		Configuration	
	No heat	Reheat coil	No heat	Reheat coil	No heat*	Reheat coil	No heat*	Reheat coil	Preheat coil	
	Flat filters	Flat filters	Angular filters	Angular filters	Flat filters	Flat filters	Angular filters	Angular filters	Flat filters	Angular filters
	Cooling coil	Cooling coil	Cooling coil	Cooling coil	N/A	N/A	N/A	N/A	Cooling coil	Cooling coil
	Fan	Fan	Fan	Fan	Fan	Fan	Fan	Fan	Fan	Fan
002	142.34 (64.56)		187.56 (85.08)		122.36 (55.50)		149.39 (67.76)		157.12 (71.27)	184.19 (83.55)
003	170.89 (77.51)		213.02 (96.62)		148.04 (67.150		169.18 (76.74)		186.67 (84.67)	208.34 (94.50)
004	207.68 (94.20)		257.99 (117.02)		182.04 (82.47)		205.76 (93.33)		233.73 (106.02)	257.55 (116.82)
005	245.41 (111.32)		317.41 (143.98)		213.25 (96.73)		253.09 (114.80)		267.13 (121.17)	307.89 (139.66)
007	262.71 (119.16)		340.86 (154.61)		224.74 (101.94)		271.81 (123.29)		298.53 (135.41)	346.93 (157.36)
010	302.58 (137.25)		392.63 (178.09)		260.15 (118.00)		312.73 (141.85)		341.67 (154.98)	395.58 (179.43)
015	359.18 (162.92)		463.09 (210.05)		352.58 (159.93)		411.89 (186.83)		419.72 (190.38)	480.74 (218.06)
020	445.55 (202.10)		596.73 (270.67)		440.70 (199.90)		533.01 (241.77)		511.86 (232.18)	606.56 (275.13)
025	559.02 (253.57)		736.09 (333.89)		554.95 (251.72)		658.10 (298.51)		616.52 (279.65)	773.96 (351.06)
030	603.25 (273.63)		817.52 (370.82)		599.00 (271.70)		730.10 (331.17)		633.19 (287.21)	830.10 (376.53)

Note: *Ventilation only

Physical Data

Table 13: Base Unit Cabinet Weights—Vertical Unit

Unit size	Weight—lbs (kg)					
	Configuration		Configuration		Configuration	
	No heat	Reheat coil	No heat*	Reheat coil	No heat*	Reheat coil
	Flat filters	Flat filters	Flat filters	Flat filters	Flat filters	Flat filters
	Cooling coil	Cooling coil				
	Fan	Fan	Fan	Fan	Fan	Fan
002	134.70 (61.10)		134.70 (61.10)		134.70 (61.10)	
003	183.20 (83.10)		183.20 (83.10)		183.20 (83.10)	
004	209.79 (95.16)		209.79 (95.16)		209.79 (95.16)	
005	239.00 (108.40)		239.00 (108.40)		239.00 (108.40)	
007	349.08 (158.30)		349.08 (158.30)		349.08 (158.30)	
010	399.23 (181.09)		399.23 (181.09)		399.23 (181.09)	
015	484.20 (219.63)		484.20 (219.63)		484.20 (219.63)	
020	566.96 (257.17)		566.96 (257.17)		566.96 (257.17)	
025	725.28 (328.98)		725.28 (328.98)		725.28 (328.98)	
030	750.14 (340.26)		750.14 (340.26)		750.14 (340.26)	

Note: *Ventilation only

Table 14: Fan Weights

Unit size	Fan	Weight—lbs (kg)
002	DA 7/7	19.03 (8.63)
003	DA 9/9	33.95 (15.40)
004	DA 9/9	33.95 (15.40)
005	DA 10/10	41.45 (18.80)
007	DA 12/12	60.85 (27.60)
010	DA 12/12	60.85 (27.60)
015	DA 10/10 TWIN	79.37 (36.00)
020	DA 12/12 TWIN	126.77 (57.50)
025	DA 15/15 TWIN	154.88 (70.25)
030	DA 15/15 TWIN	154.88 (70.25)

Table 15: Electric Heat Weights

Unit size	Weight—lbs (kg)			
	1 Step	2 Steps	3 Steps	4 Steps
002	31 (14.00)	35 (16.00)	-	-
003	32 (14.50)	36 (16.50)	41 (18.50)	45 (20.50)
004	32 (14.50)	36 (16.50)	41 (18.50)	45 (20.50)
005	34 (15.50)	39 (17.50)	43 (19.50)	47 (21.50)
007	36 (16.50)	41 (18.50)	45 (20.50)	50 (22.50)
010	36 (16.50)	41 (18.50)	45 (20.50)	50 (22.50)

Fan Data

Table 16: Fan Data

Fan data	Unit size									
	002	003	004	005	007	010	015	020	025	030
Fan type	DWDI FC	DWDI FC	DWDI FC	DWDI FC	DWDI FC	DWDI FC	Twin DWDI FC	Twin DWDI FC	Twin DWDI FC	Twin DWDI FC
Diameter	7/7	9/9	9/9	10/10	12/12	12/12	10/10	12/12	15/15	15/15
HP range	.50–2	.50–3	.5–5	.75–5	1–5	1–7.5	2–15	3–15	5–20	5–20
cfm minimum—fan limit	206	206	529	529	765	765	1059	1529	2118	2118
cfm maximum—fan limit	2,088	2,088	5,765	6,176	8,529	8,529	12,353	17,059	26,706	26,706
Maximum rpm	2,680	2,650	2,650	2,100	1,700	1,700	2,100	1,700	1,500	1,500
Class	1	1	1	1	1	1	1	1	1	1
Motor sheave	VP, VL, VM	VP, VL, VM	VP, VL, VM	VP, VL, VM	VP, VL, VM	VP, VL, VM	VP, VL, VM	VP, VL, VM	VP, VL, VM	VP, VL, VM
Fan sheave	AK, BK	AK, BK	AK, BK	AK, BK	AK, BK	AK, BK	AK, BK	AK, BK	AK, BK	AK, BK
Belt	A, AX, B, BX	A, AX, B, BX	A, AX, B, BX	A, AX, B, BX	A, AX, B, BX	A, AX, B, BX	A, AX, B, BX	A, AX, B, BX	A, AX, B, BX	A, AX, B, BX
Fan shaft diameter	3/4"	3/4"	3/4"	3/4"	1.0"	1.0"	3/4"	1.0"	1.0"	1.0"
Weight—lbs (kg)	19.03 (8.63)	33.95 (15.40)	33.95 (15.40)	41.45 (18.80)	60.85 (27.60)	60.85 (27.60)	79.37 (36.00)	126.77 (57.50)	154.87 (70.25)	154.87 (70.25)

Filter Data

Table 17: Filter Data

Filter data	Unit size									
	002	003	004	005	007	010	015	020	025	030
Flat filters										
Flat filter bank number	1	1	1	1	1	1	2	2	2	2
Flat filter (qty) size	(1) 16 × 25	(1) 18 × 24	(2) 16 × 20	(2) 20 × 24	(2) 24 × 24	(3) 20 × 25	(3) 12 × 24 (3) 24 × 24	(6) 24 × 24	(4) 20 × 24 (4) 24 × 24	(6) 16 × 25 (4) 20 × 25
Flat filter depth options	2", 4"	2", 4"	2", 4"	2", 4"	2", 4"	2", 4"	2", 4"	2", 4"	2", 4"	2", 4"
Angular filters										
Angular filter bank number	1	1	1	2	2	2	2	3	3	3
Angular filter (qty) size	(1) 20 × 24	(2) 16 × 20	(2) 20 × 20	(4) 16 × 20	(4) 16 × 25	(6) 16 × 20	(6) 20 × 24	(9) 20 × 24	(6) 20 × 24 (6) 24 × 24	(6) 20 × 24 (6) 24 × 24
Angular filter depth options	2"	2"	2"	2"	2"	2"	2"	2"	2"	2"

Performance Data

Coil Data

Table 18: Coil Data—Chilled Water

Chilled water coil data	Unit size									
	002	003	004	005	007	010	015	020	025	030
Fin height	14	16	16	22	22	26	32.5	45	45	52.5
Fin length	21	27	34	34	48	54	65	65	80	80
Rows	4, 6	4, 6	4, 6	4, 6	4, 6	4, 6	4, 6	4, 6	4, 6	4, 6
FPI	12	12	12	12	12	12	12	12	12	12
Connection material	Copper sweat	Copper sweat	Copper sweat	Copper sweat	Copper sweat	Copper sweat	Steel NPT	Steel NPT	Steel NPT	Steel NPT
Connection size 4-row	0.875 OD	1.125 OD	1.625 OD	1.625 OD	1.625 OD	1.625 OD	1.5 NPT	2.5 NPT	2.5 NPT	2.5 NPT
Connection size 6-row	0.875 OD	1.125 OD	1.625 OD	1.625 OD	1.625 OD	2.125 OD	2.0 NPT	2.5 NPT	2.5 NPT	2.5 NPT
Casing	Galv.	Galv.	Galv.	Galv.	Galv.	Galv.	Galv.	Galv.	Galv.	Galv.

Table 19: Coil Data—DX Coils

DX coils data	Unit size									
	002	003	004	005	007	010	015	020	025	030
Fin height	14	16	16	22	22	26	32.5	45	45	52.5
Fin length	21	27	34	34	48	54	65	65	80	80
Rows	4, 6	4, 6	4, 6	4, 6	4, 6	4, 6	4, 6	4, 6	4, 6	4, 6
FPI	12	12	12	12	12	12	12	12	12	12
Connection material	Copper sweat	Copper sweat	Copper sweat	Copper sweat	Copper sweat	Copper sweat	Copper sweat	Copper sweat	Copper sweat	Copper sweat
Suction Connection size 4-row	0.875 OD	1.125 OD	1.125 OD	1.125 OD	1.625 OD	1.625 OD	1.625 OD	1.625 OD	1.625 OD	1.625 OD
Liquid Connection size 4-row	0.625 OD	0.625 OD	0.625 OD	0.875 OD	0.875 OD	1.125 OD	0.625 OD	0.875 OD	1.125 OD	1.125 OD
Suction Connection size 6-row	0.875 OD	1.125 OD	1.625 OD	1.625 OD	1.625 OD	2.125 OD	1.625 OD	1.625 OD	2.125 OD	2.625 OD
Liquid Connection size 6-row	0.625 OD	0.625 OD	0.625 OD	1.125 OD	1.125 OD	1.125 OD	0.875 OD	0.875 OD	1.125 OD	1.375 OD
Casing	Galv.	Galv.	Galv.	Galv.	Galv.	Galv.	Galv.	Galv.	Galv.	Galv.
Number of circuits	1	1	1	1	1	1	2	2	2	2
Circuit type	Normal	Normal	Normal	Normal	Normal	Normal	Face split	Face split	Face split	Face split

Table 20: Coil Data—Hot Water Coils

Hot water coil data	Unit size									
	002	003	004	005	007	010	015	020	025	030
Fin height	14	16	16	22	22	26	32.5	45	45	52.5
Fin length	21	27	34	34	48	54	65	65	80	80
Rows	1, 2	1, 2	1, 2	1, 2	1, 2	1, 2	1, 2	1, 2	1, 2	1, 2
FPI	12	12	12	12	12	12	12	12	12	12
Connection material	Copper sweat	Copper sweat	Copper sweat	Copper sweat	Copper sweat	Copper sweat	Steel NPT	Steel NPT	Steel NPT	Steel NPT
Connection size 1-row	.625 OD	.625 OD	.875 OD	.875 OD	1.125 OD	1.375 OD	1.0 NPT	1.5 NPT	1.5 NPT	2.0 NPT
Connection size 2-row	.875 OD	.875 OD	1.125 OD	1.125 OD	1.625 OD	1.625 OD	1.5 NPT	2.0 NPT	2.0 NPT	2.0 NPT
Casing	Galv.	Galv.	Galv.	Galv.	Galv.	Galv.	Galv.	Galv.	Galv.	Galv.

Drain Pan Data

Table 21: Drain Pan Connections

Standard and optional stainless steel	Unit size									
	002	003	004	005	007	010	015	020	025	030
Arrangement	Sloped	Sloped	Sloped	Sloped	Sloped	Sloped	Sloped	Sloped	Sloped	Sloped
Connection size - Main	1" ID MPT	1" ID MPT	1" ID MPT	1" ID MPT	1" ID MPT	1" ID MPT	1-1/4" ID MPT	1-1/4" ID MPT	1-1/4" ID MPT	1-1/4" ID MPT
Connection size - Secondary	1/2" ID MPT	1/2" ID MPT	1/2" ID MPT	1/2" ID MPT	1/2" ID MPT	1/2" ID MPT	1/2" ID MPT	1/2" ID MPT	1/2" ID MPT	1/2" ID MPT

Electric Heat Data

Table 22: Electric Heat Data for Unit Sizes

Unit size	Voltage	Phase	kW Offering			
			1 Stage	2 Stages	3 Stages	4 Stages
002	120	1	1.5 - 4.5	4 - 9	NA	NA
	240	1	1.5 - 9	4 - 10	NA	NA
	240	3	1.5 - 10	4 - 10	NA	NA
	480	3	1.5 - 10	4 - 10	NA	NA
	600	3	1.5 - 10	4 - 10	NA	NA
003	120	1	2.5 - 4.5	4 - 9	10 -13	14 - 18
	240	1	2.5 - 9	4 - 18	15 - 20	20
	240	3	2.5 - 15	4 - 20	15 - 20	20
	480	3	2.5 - 20	4 - 20	15 - 20	20
	600	3	2.5 - 20	4 - 20	15 - 20	20
004	120	1	2.5 - 4.5	4 - 9	10 -13	14 - 18
	240	1	2.5 - 9	4 - 18	15 - 20	20
	240	3	2.5 - 15	4 - 20	15 - 20	20
	480	3	2.5 - 20	4 - 20	15 - 20	20
	600	3	2.5 - 20	4 - 20	15 - 20	20
005	120	1	4 - 4.5	4 - 9	10 -13	14 - 18
	240	1	4 - 9	4 - 18	15 - 26	20 - 26
	240	3	4 - 15	4 - 26	15 - 26	20 - 26
	480	3	4 - 26	4 - 26	15 - 26	20 - 26
	600	3	4 - 26	4 - 26	15 - 26	20 - 26
007	120	1	NA	6 - 9	10 -13	14 - 18
	240	1	6 - 9	6 - 18	15 - 26	20 - 36
	240	3	6 - 15	6 - 30	15 - 38	20 - 38
	480	3	6 - 30	6 - 38	15 - 38	20 - 38
	600	3	6 - 38	6 - 38	15 - 38	20 - 38
010	120	1	NA	6 - 9	10 -13	14 - 18
	240	1	6 - 9	6 - 18	15 - 26	20 - 36
	240	3	6 - 15	6 - 30	15 - 45	20 - 55
	480	3	6 - 30	6 - 55	15 - 55	20 - 55
	600	3	6 - 38	6 - 55	15 - 55	20 - 55

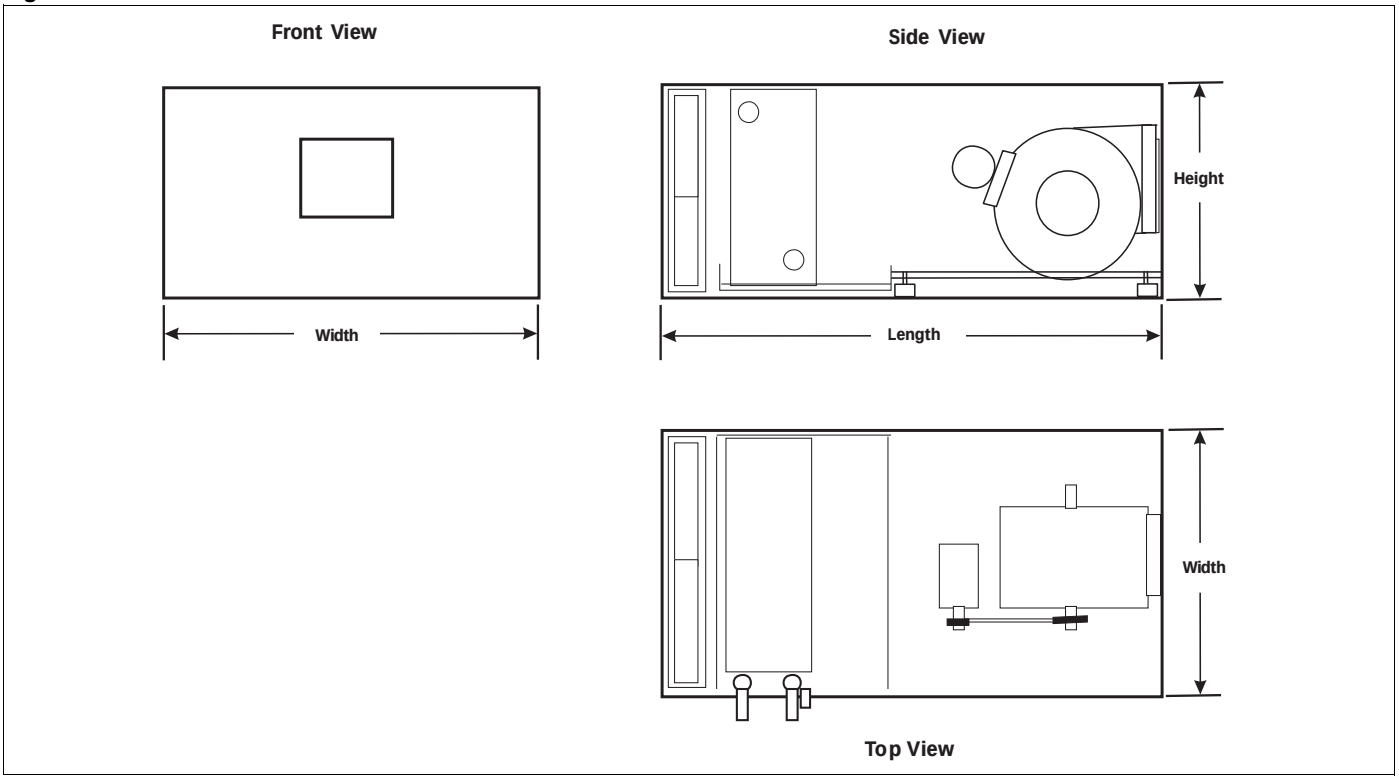
Cabinet Dimensions—Horizontal

Table 23: Cabinet Dimensions—Horizontal Unit

Dimension/ Configuration		Unit size									
		002	003	004	005	007	010	015	020	025	030
Cabinet Dimension		**Unit height and width dimensions in. (mm)**									
Height		20.47 (520)	22.44 (570)	22.44 (570)	28.35 (720)	28.35 (720)	32.48 (825)	39.37 (1000)	51.57 (1310)	51.57 (1310)	59.06 (1500)
Width		28.54 (725)	34.84 (885)	42.52 (1080)	42.52 (1080)	56.50 (1435)	63.00 (1600)	74.41 (1890)	75.00 (1905)	89.96 (2285)	89.96 (2285)
Configuration		**Unit length dimensions in. (mm)**									
Cooling only or cooling with reheat coils	Flat filter	47.84 (1215)	47.84 (1215)	53.35 (1355)	54.72 (1390)	58.86 (1495)	58.86 (1495)	53.74 (1365)	56.30 (1430)	62.00 (1575)	62.00 (1575)
	Angular filter	58.27 (1480)	55.12 (1400)	60.63 (1540)	65.95 (1675)	70.08 (1780)	70.08 (1780)	64.37 (1635)	71.26 (1810)	76.97 (1955)	80.12 (2035)
Cooling with preheat coils	Flat filter	51.97 (1320)	51.97 (1320)	59.25 (15.05)	59.45 (15.10)	65.55 (1665)	65.55 (1665)	62.80 (15.95)	65.35 (1660)	69.09 (17.55)	69.09 (17.55)
	Angular filter	62.40 (15.85)	59.25 (1505)	66.53 (1690)	70.67 (17.95)	76.77 (1950)	76.77 (1950)	73.42 (18.65)	80.32 (2040)	84.06 (2135)	87.20 (2215)
Heating only	Flat filter	39.96 (1015)	39.96 (1015)	45.47 (1155)	45.67 (1160)	49.80 (1265)	49.80 (1265)	52.56 (1335)	55.51 (1410)	61.42 (1560)	61.42 (1560)
	Angular filter	50.39 (1280)	47.24 (1200)	52.76 (1340)	56.89 (1445)	61.02 (1550)	61.02 (1550)	63.19 (1605)	70.47 (1790)	76.38 (1940)	79.53 (2020)
Ventilation only	Flat filter	39.96 (1015)	39.96 (1015)	45.47 (1155)	45.67 (1160)	49.80 (1265)	49.80 (1265)	52.56 (1335)	55.51 (1410)	61.42 (1560)	61.42 (1560)
	Angular filter	50.39 (1280)	47.24 (1200)	52.76 (1340)	56.89 (1445)	61.02 (1550)	61.02 (1550)	63.19 (1605)	70.47 (1790)	76.38 (1940)	79.53 (2020)
Discharge Opening Dimension		**Unit height and width dimensions in. (mm)**									
Height		9.17 (233)	11.77 (299)	11.77 (299)	13.07 (332)	15.51 (394)	15.51 (394)	13.07* (332)	15.51* (394)	18.54* (471)	18.54* (471)
Width		8.74 (222)	10.20 (259)	10.20 (259)	11.34 (288)	13.46 (342)	13.46 (342)	11.34 (288)	13.46 (342)	15.83 (402)	15.83 (402)

Note: * Twin openings

Figure 33: Horizontal Unit Dimensions



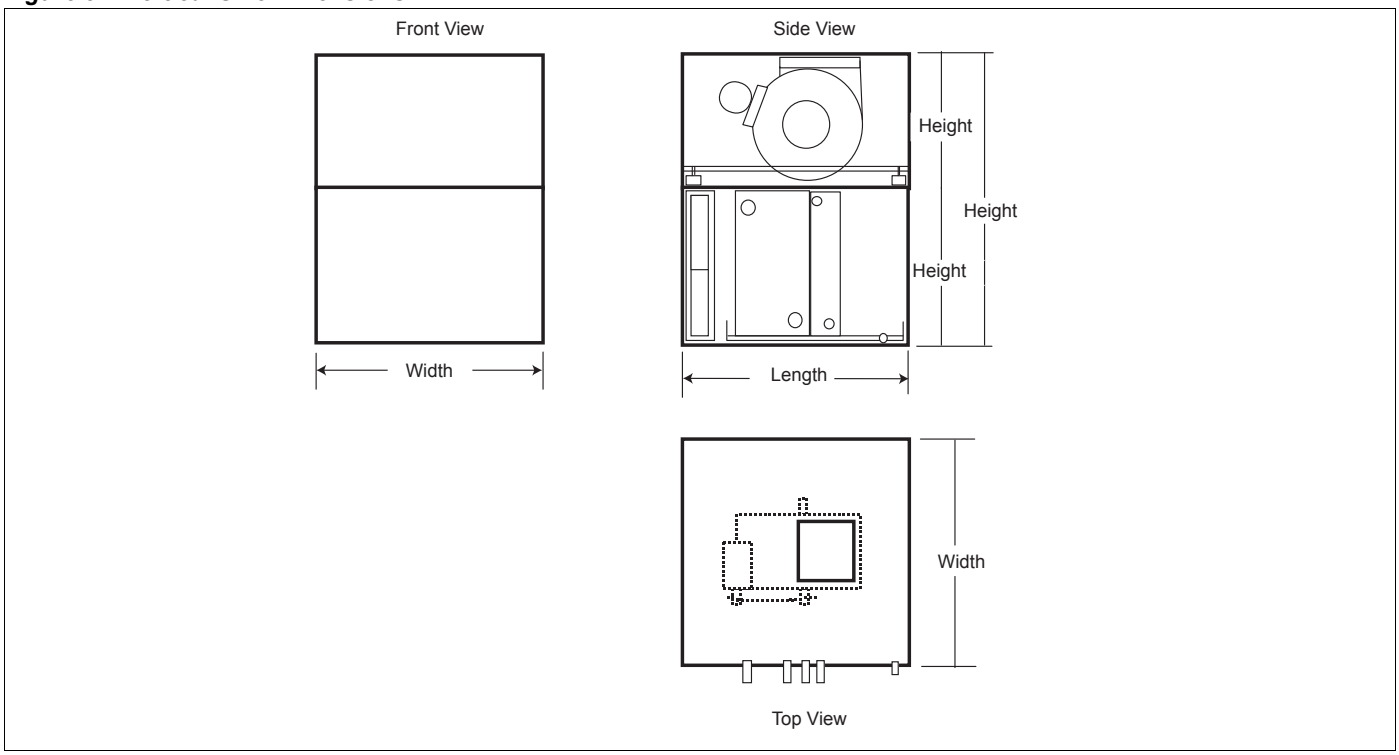
Cabinet Dimensions—Vertical

Table 24: Cabinet Dimensions—Vertical Unit

Dimensions	Unit size									
	002	003	004	005	007	010	015	020	025	030
Cabinet Dimension	**Unit height, length, and width dimensions in. (mm)**									
Width—in (mm)	28.54 (725)	34.84 (885)	42.52 (1080)	42.52 (1080)	56.50 (1435)	62.99 (1600)	74.41 (1890)	75.00 (1905)	89.96 (2285)	89.96 (2285)
Length—in (mm)	29.92 (760)	33.07 (840)	33.07 (840)	36.42 (925)	39.96 (1015)	39.96 (1015)	42.72 (1085)	47.83 (1215)	51.18 (1300)	51.18 (1300)
Upper section height—in (mm)	17.13 (435)	19.88 (505)	19.88 (505)	22.05 (560)	24.61 (625)	24.61 (625)	23.82 (605)	26.97 (685)	31.30 (795)	31.30 (795)
Lower section height—in (mm)	20.47 (520)	22.44 (570)	22.44 (570)	28.35 (720)	28.35 (720)	32.48 (825)	39.37 (1000)	51.57 (1310)	51.57 (1310)	59.06 (1500)
Discharge Opening Dimensions	**Unit height and width dimensions in. (mm)**									
Height—in (mm)	9.17 (233)	11.77 (299)	11.77 (299)	13.07 (332)	15.51 (394)	15.51 (394)	13.07* (332)	15.51* (394)	18.54* (471)	18.54* (471)
Width—in (mm)	8.74 (222)	10.20 (259)	10.20 (259)	11.34 (288)	13.46 (342)	13.46 (342)	11.34 (288)	13.46 (342)	15.83 (402)	15.83 (402)

Note: * Twin openings

Figure 34: Vertical Unit Dimensions

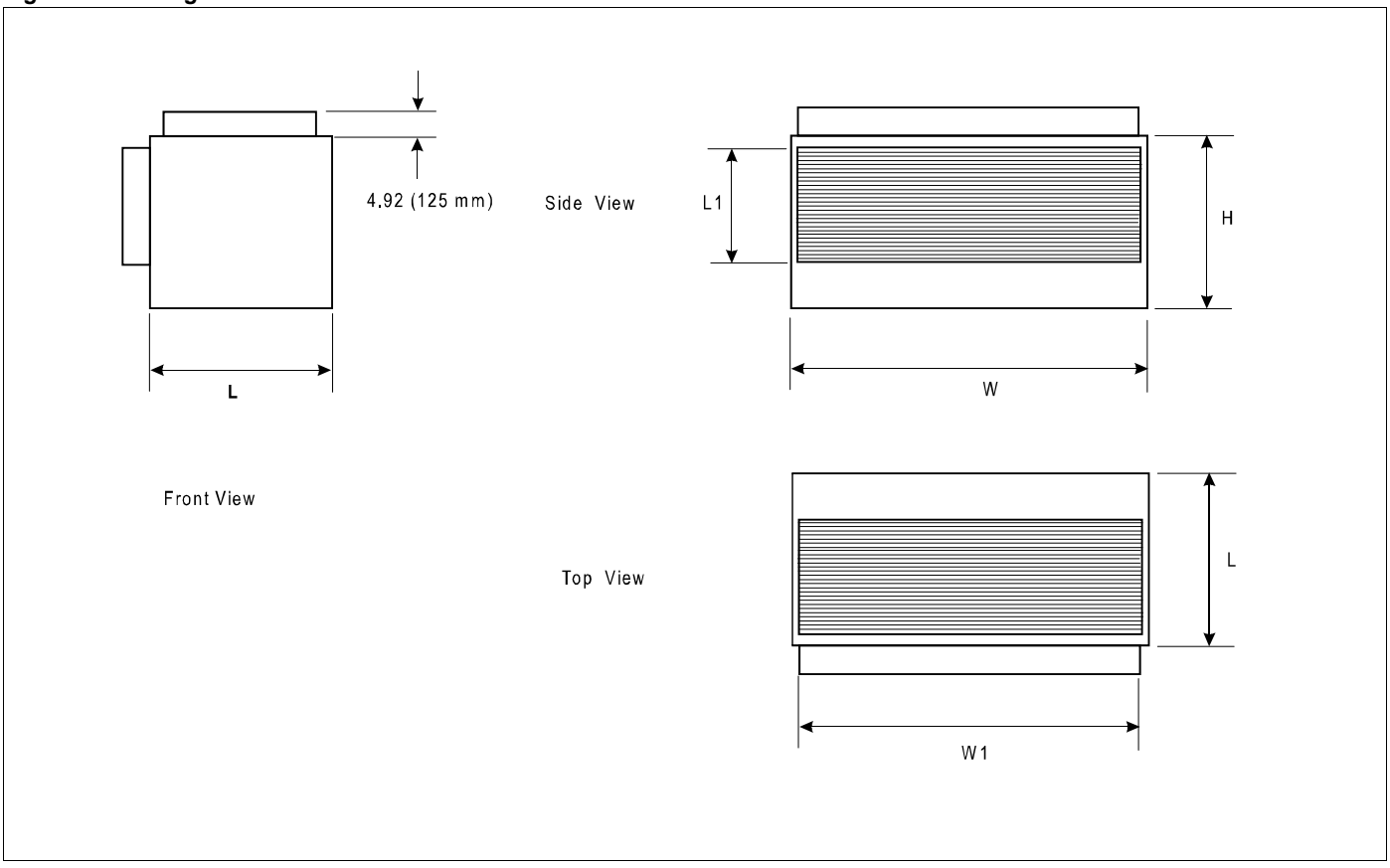


Mixing Box Dimensions

Table 25: Mixing Box Dimensions—Horizontal and Vertical Units

Unit size	Cabinet in. (mm)			Damper in. (mm)		
	W	H	L	W1	L1	Area (ft^2)
002	28.54 (725)	20.47 (520)	10.24 (260)	26.18 (665)	7.87 (200)	1.43
003	34.84 (885)	22.44 (570)	10.24 (260)	32.48 (825)	7.87 (200)	1.78
004	42.52 (1080)	22.44 (570)	10.24 (260)	40.16 (1020)	7.87 (200)	2.20
005	42.52 (1080)	28.35 (720)	14.17 (360)	40.16 (1020)	11.81 (300)	3.29
007	56.50 (1435)	28.35 (720)	14.17 (360)	54.13 (1375)	11.81 (300)	4.44
010	62.99 (1600)	32.48 (825)	14.17 (360)	60.63 (1540)	11.81 (300)	4.97
015	74.41 (1890)	39.37 (1000)	18.11 (460)	72.05 (1830)	15.75 (400)	7.88
020	75.00 (1905)	51.57 (1310)	25.98 (660)	72.64 (1845)	23.62 (600)	11.92
025	89.96 (2285)	51.57 (1310)	25.98 (660)	87.60 (2225)	23.62 (600)	14.37
030	89.96 (2285)	59.06 (1500)	29.92 (760)	87.60 (2225)	27.56 (700)	16.76

Figure 35: Mixing Box DImensions



Electric Heat Dimensions—Left/Right Oriented

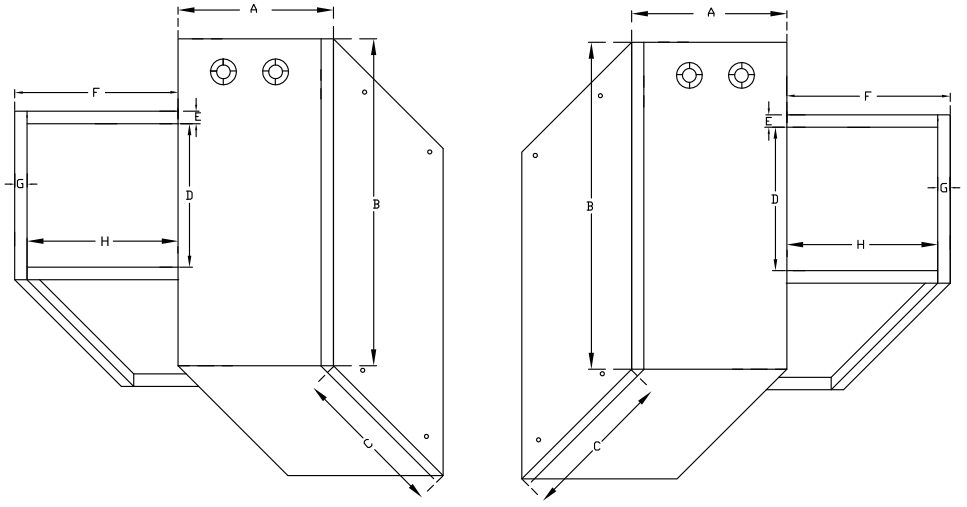
Table 26: Electric Heat Dimensions - in. (mm), Sizes 002 through 004

Dimension -in. (mm)	Unit Size									
	002		003				004			
	1 Step	2 Steps	1Step	2 Steps	3 Steps	4 Steps	1Step	2 Steps	3 Steps	4 Steps
A	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)
B	20 (508)	20 (508)	22-1/4 (565)	22-1/4 (565)	22-1/4 (565)	22-1/4 (565)	22-1/4 (565)	22-1/4 (565)	22-1/4 (565)	22-1/4 (565)
C	11-1/2 (292)	16 (406)	11-1/2 (292)	16 (406)	20 (508)	24 (610)	11-1/2 (292)	16 (406)	20 (508)	24 (610)
D	8-3/4 (222)	8-3/4 (222)	10-3/8 (264)	10-3/8 (264)	10-3/8 (264)	10-3/8 (264)	10-3/8 (264)	10-3/8 (264)	10-3/8 (264)	10-3/8 (264)
E	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)
F	10 (254)	10 (254)	12-3/4 (324)	12-3/4 (324)	12-3/4 (324)	12-3/4 (324)	12-3/4 (324)	12-3/4 (324)	12-3/4 (324)	12-3/4 (324)
G	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)
H	9-1/4 (235)	9-1/4 (235)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)

Table 27: Electric Heat Dimensions - in. (mm), Sizes 005 through 010

Dimension - in. (mm)	Unit Size											
	005				007				010			
	1Step	2 Steps	3 Steps	4 Steps	1Step	2 Steps	3 Steps	4 Steps	1Step	2 Steps	3 Steps	4 Steps
A	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)	9-1/2 (241)
B	23-1/2 (597)	23-1/2 (597)	23-1/2 (597)	23-1/2 (597)	25 (635)	25 (635)	25 (635)	25 (635)	25 (635)	25 (635)	25 (635)	25 (635)
C	11-1/2 (292)	16 (406)	20 (508)	24 (610)	11-1/2 (292)	16 (406)	20 (508)	24 (610)	11-1/2 (292)	16 (406)	20 (508)	24 (610)
D	11-3/8 (289)	11-3/8 (289)	11-3/8 (289)	11-3/8 (289)	13-1/2 (343)	13-1/2 (343)	13-1/2 (343)	13-1/2 (343)	13-1/2 (343)	13-1/2 (343)	13-1/2 (343)	13-1/2 (343)
E	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)
F	14 (356)	14 (356)	14 (356)	14 (356)	16-1/2 (419)	16-1/2 (419)	16-1/2 (419)	16-1/2 (419)	16-1/2 (419)	16-1/2 (419)	16-1/2 (419)	16-1/2 (419)
G	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)	3/4 (19)
H	13-1/4 (337)	13-1/4 (337)	13-1/4 (337)	13-1/4 (337)	15-3/4 (400)	15-3/4 (400)	15-3/4 (400)	15-3/4 (400)	15-3/4 (400)	15-3/4 (400)	15-3/4 (400)	15-3/4 (400)

Figure 36: Electric Heat Dimensions



NOTE: Heaters are not intended to be installed with less than 20" of straight duct at the outlet of the heater.

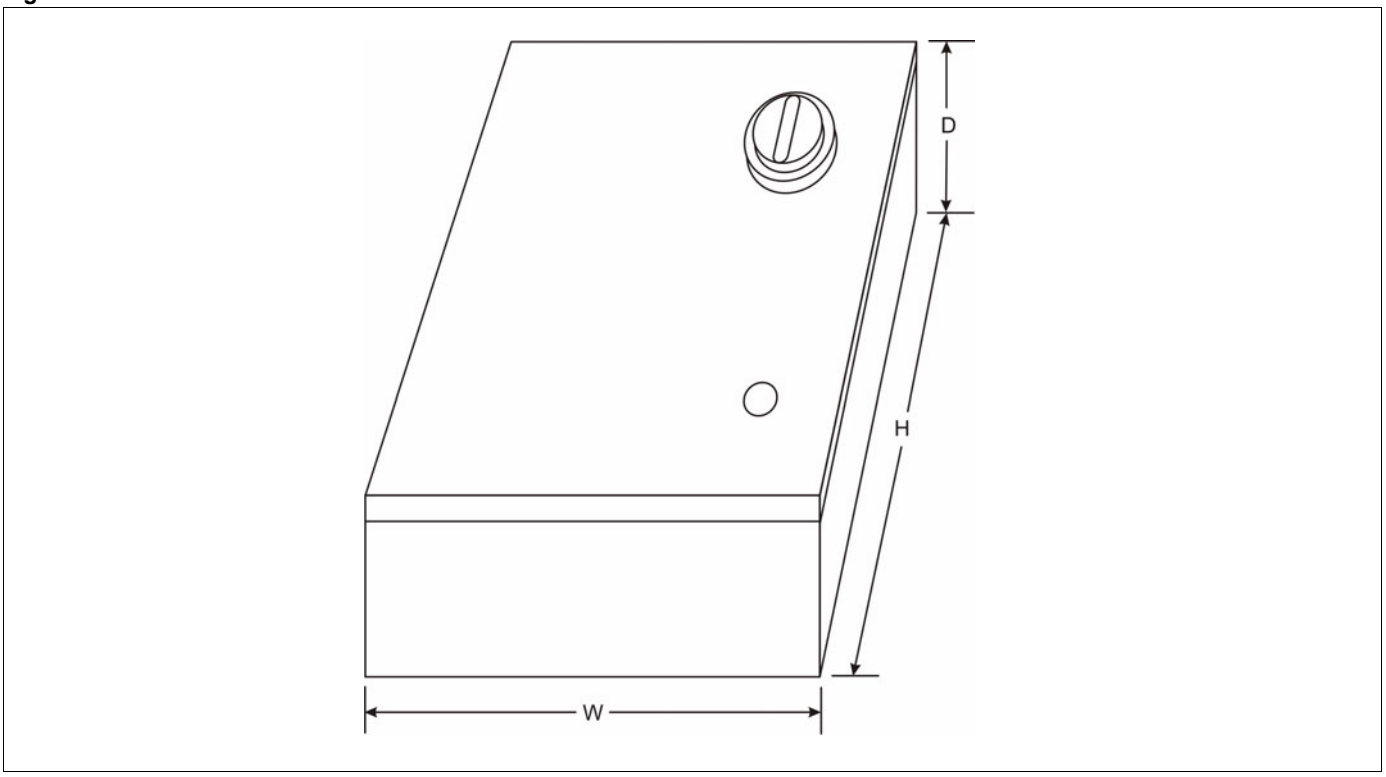
Dimensional Data

Control Box Dimensions

Table 28: Control Box Dimensions – Left and Right Hand Access

Dimension/ Configuration	Unit size									
	002	003	004	005	007	010	015	020	025	030
Disconnect/Starter/ Transformer	**Dimensions in. (mm)**									
Width	8 (203)	8 (203)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)
Depth	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)
Height	15 (381)	15 (381)	20 (508)	20 (508)	20 (508)	20 (508)	20 (508)	20 (508)	20 (508)	20 (508)
Disconnect Only	**Dimensions in. (mm)**									
Width	5 (127)	5 (127)	10 (254)	10 (254)	10 (254)	10 (254)	10 (254)	10 (254)	10 (254)	10 (254)
Depth	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)
Height	8 (203)	8 (203)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)

Figure 37: Control Box Dimensions



Startup Checks

When performing startup and service, always take thorough safety precautions. Start-up functions must be performed by trained, experienced personnel.

⚠ WARNING

ROTATING FAN.
Can cause severe injury or death. Before servicing fans, lockout and tag out power.

⚠ AVERTISSEMENT

PIÈCES MOBILES DANGEREUSES.
Avant de réparer ou entretenir les ventilateurs, coupez l'alimentation èlectrique de cet appareil et bloquez le commutateur à OFF.

⚠ WARNING

FIRE/ELECTRIC SHOCK HAZARD.
Can cause property damage, personal injury or death. Wire fan power supply and ground motor frame in accordance with local electric codes.

⚠ AVERTISSEMENT

Risques d'incendie et d'électrocution pouvant causer des dommages matériels, des blessures et même la mort.
L'alimentation électrique du moteur du ventilateur de même que la mise à la terre du chàssis du moteur doivent être faits conformément aux codes d'installations électriques en vigueur.

⚠ WARNING

FAN MOTOR REQUIRES OVERLOAD PROTECTION.
Failure to provide motor overload protection can result in fire, property damage, electric shock, personal injury or death. Connect motor to an overload protective device rated in compliance with local electric codes.

⚠ AVERTISSEMENT

Risques d'incendie et d'électrocution pouvant causer des dommages matériels, des blessures et même la mort.
Connecter au moteur du ventilateur électrique un dispositif de protection contre les surcharges conforme aux codes d'installations électriques en vigueur.

⚠ CAUTION

DO NOT OVERHEAT FAN MOTOR.
High air temperatures in the fan section can cause the fan motor to burnout. On draw-through air handlers or air handlers with the fan section down the air stream from the heating section, the discharge air temperature of the heating section must not exceed 104°F (40°C).

⚠ ATTENTION

Risques de dommages dans le moteur du ventilateur électrique. Si la température de l'air a proximité du ventilateurest élevée, le moteurdu ventilateur électrique peut chauffer et brûler. Sur les transmetteurs d'air à circulation transversale ou les transmetteurs dont le ventilateur est en aval de l'unité de chauffage, régler la température de l'air sortant de l'unité de chauffage à 40°C (104°F).

Before Starting the Unit

Make sure that fan electrical power source is disconnected and locked in the OFF position before entering fan section.

1. With ductwork connected, check the unit for complete and proper installation.
2. Check that all construction debris is removed and filters are clean.
3. Check that all electrical work is complete and properly terminated. Check that all electrical connections are tight and that the proper voltage is connected. Phase imbalance must not exceed 2%.
4. Ball bearings on fan shaft and motor are prelubricated and do not need grease before startup.
5. Check tightness of setscrews in bearings and fan wheel(s). If retightening is needed, make certain the fan wheel(s) are aligned properly or setscrews are torqued per Table 2 on page 23.

⚠ CAUTION

Equipment damage due to loose fasteners represents improper start-up and equipment abuse. It is not covered by the warranty.

⚠ ATTENTION

Des dommages causés à l'unité dû à des attaches mal serrées signifie que le démarrage a été inadéquat et constitue un usage abusif de l'équipement. Ceci n'est pas couvert par la garantie.

6. Check alignment of fan and motor sheaves and belt tension. Adjust if necessary. Check tightness of sheave setscrews and/or capscrews. See Figure 25 and Figure 26 on page 27 and Figure 27 on page 28.
7. Leak test the thermal system to verify that connections are tight.

8 Check that condensate drain is trapped.

9 Rotate shaft by hand to be sure it is free.

10 Fan startup: Fan should start and run. Observe the rotation. If the fan is operating backward, reverse two legs of the three-phase supply power.

Note: Variable pitch fan drives are usually provided for operation in the mid-speed adjustment range. However, the drives usually ship with the adjustment opened for minimum fan speed. Adjust the drives for the proper airflow. See “Fan Drive Adjustments” on page 24.

After first 48 hours of operation:

1 Disconnect and lockout electrical power source.

2 Check tightness of all bearing, wheel, and sheave setscrews (or capscrews). See Table 3.

3 Recheck belt tension and adjust if necessary. Belts tensioned sufficiently to slip one to two seconds at startup will perform satisfactorily, extending life and reducing vibration. If retensioning is necessary, be certain to retain sheave alignment.

Table 29: Bearing Collar and Wheel Hub Setscrew Torque

Setscrew	Minimum torque	
Diameter (inches)	**ft / lbs**	**kg / M**
1/4	5.5	.76
1/16	10.5	1.45
3/8	19.0	2.63
7/16	29.0	4.01

Operating Limits

Do not exceed the operating limits in Table 6. A fan wheel that is operated beyond the rpm and temperature limits shown may suffer permanent distortion or fracture. The resulting unbalance may cause severe unit vibration.

Table 30: Fan Operating Limits

Forward curved—housed							
Diameter	7 × 7	9 × 9	10 × 10	12 × 12	Twin 10"	Twin 12"	Twin 15"
Maximum rpm	2680	2650	2100	1700	2100	1700	1500

Fan Vibration Levels

Each unit as shipped is trim balanced to operate smoothly. To provide satisfactory operation after shipping and installation, use the accepted industry guidelines for field balancing fans. Vibration ≤ 0.20 in/sec.

Note: Excessive vibration from any cause contributes to premature fan and motor bearing failure. Monitor overall vibration levels every six months of operation. An increase in levels is an indication of potential trouble.

Vibration Causes

1 Wheel imbalance

- **a** Dirt or debris on wheel blades
- **b** Loose setscrews in wheel hub or bearing-to-shaft
- **c** Wheel distorted from overspeed

2 Bent shaft

3 Drive faulty

- **a** Variable pitch sheaves—Axial and radial runout of flanges, uneven groove spacing, out of balance. Also similar faults in driven sheave.
- **b** Bad V-belts, lumpy or mismatched, belt tension too tight or too loose

4 Bad bearings, loose bearing hold-down bolts

5 Motor imbalance

6 Fan section not supported evenly on foundation

Periodic Service and Maintenance

1 Check all moving parts for wear every six months.

2 Check bearing collar, sheave, and wheel hub setscrews, sheave capscrews, and bearing hold-down bolts for tightness every six months.

Ball Bearing Lubrication

1 Motor bearings—All ball bearings are prelubricated and do not require additional grease during installation. However, periodic cleaning out and renewal of grease is necessary. Exercise extreme care when cleaning to prevent foreign matter from entering the bearing. It is also important to avoid over greasing. Only use a high grade, clean mineral grease with the following characteristics.

   a Melting point preferably over 302°F (150°C).

   b Does not separate by oil and soap under operating and storage conditions.

   c Free of abrasive matter, acid, alkali, and moisture.

   d Specific greasing instructions are located on a label attached to the fan section door.

2 Fan shaft bearings—All ball bearings are prelubricated and do not require additional grease during installation. Periodic greasing is necessary. Bearings are accessible in the fan section. A grease fitting is located on each side of the fan shaft. **Do not over lubricate.** Wipe off any excess grease to prevent overheating. The lubrication interval varies with the period of operation and temperature of the ambient air. Use the guidelines in the table below:

Table 31: Bearing Operating Temperature Range

Bearing operating temperature range			
Operation	**To 130°F (54°C)**	**To 150°F (66°C)**	**Over 150°F (66°C)**
Continuous operation	6 months	4 months	2 months
12-hr/day operation	12 months	12 months	6 months

Figure 38: Fan Shaft Bearing Grease Fitting

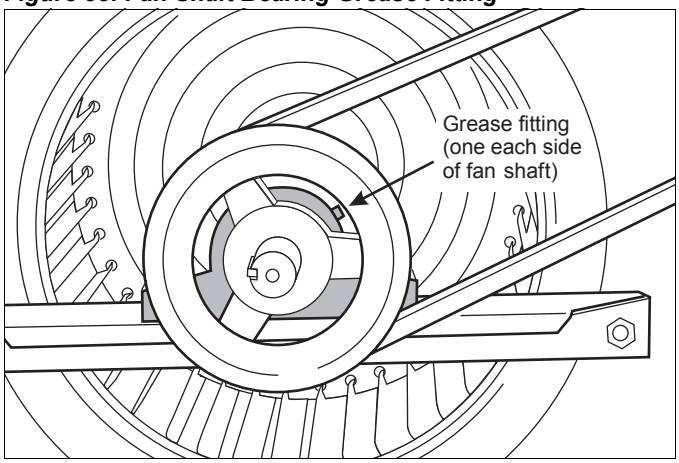


Table 32: Lubricants Recommended for Fan Shaft Ball Bearings

Manufacturer	Product name	Temperature range	
		°F	°C
Texaco Lubricants Company	Premium RB	–30 to 300	–34 to 149
Keystone Ind. Lubricants	81EP-2	0 to 250	–18 to 121
Mobil Oil Corporation	Mobilith SCH100	–40 to 350	–40 to 177
Chevron U.S.A. Inc.	SRI-2	–20 to 325	–29 to 163
Exxon Company, U.S.A.	Ronex MP	–40 to 300	–40 to 149
Shell Oil Company	Alvania No. 2	–20 to 240	–29 to 116

Note: Note:Temperature ranges over 225°F are shown for lubricants only. High temperature applications are not suitable for standard air handler components.

Fan Drive Adjustments

⚠ WARNING

ROTATING FAN can cause severe injury or death. Before servicing fans, lockout and tag out power.
Do not open the hinged access door and access panels while the unit is operating. Moving parts and strong suction forces can cause severe personal injury or death.
Before entering any fan section, make sure the electrical power source to the fan motor is disconnected, locked out and tagged out.

⚠ AVERTISSEMENT

PIÈCES MOBILES DANGEREUSES.
Avant de réparer ou entretenir les ventilateurs, coupez l'alimentation èlectrique de cet appareil et bloquez le commutateur à OFF.

Upon completion of the air balance, replace the variable pitched motor sheave with a properly sized, fixed sheave. A matching fixed sheave provides longer belt and bearing life and vibration-free operation. Initially, it is best to have a variable pitched motor sheave for the purpose of air balancing. Once the balance is achieved, fixed sheaves maintain balancing and alignment more effectively. Replace the adjustable sheaves with fixed sheaves.

With the electrical power disconnected, locked and tagged out, measure the diameter of the V-belt outer surface where it passes around the sheave (pitch diameter). Calculate fan speed from the motor nameplate rpm.

$$\text{Fan rpm} = \text{Motor rpm} \times \frac{\text{Measured diameter at motor sheave}}{\text{Measured diameter at fan sheave}}$$

VM and VP Variable Pitch Key Type Sheaves

Mounting:

1 Mount all sheaves on the motor or driving shaft with the setscrews **A** toward the motor.

2 Verify that both driving and driven sheaves are in alignment and that shafts are parallel.

3 Fit internal key **D** between sheave and shaft and lock setscrew **A** securely in place.

Adjusting:

1 Loosen setscrews **B** and **C** in moving parts of sheave and pull out external key **E**. (This key projects a small amount to provide a grip for removing.)

2 Adjust sheave pitch diameter for desired speed by opening moving parts by half or full turns from closed position.
Do not open more than five full turns for A belts or six full turns for B belts.

3 Replace external key **E** and securely tighten setscrews **B** over key and setscrews **C** into keyway in fixed half of the sheave.

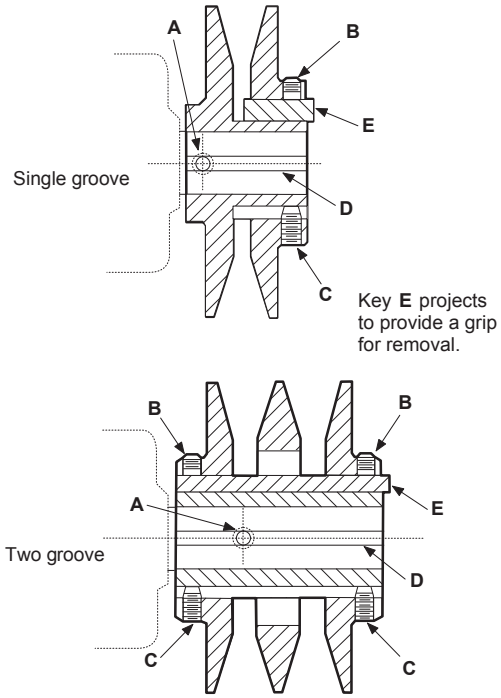
4 Put on belts and adjust belt tension.
Do not force belts over grooves. See "Fan Drive Belt Adjustment" on page 28.

5 Make future adjustments by loosening the belt tension and increasing or decreasing the pitch diameter of the sheave by half or full turns as required. Readjust belt tension before starting drive.

6 Adjust both halves of two-groove sheaves the same number of turns from closed position to provide the same pitch diameter.

7 Verify that all keys are in place and that all setscrews are tight before starting drive. Check setscrews and belt tension after 24 hours service.

Figure 39: VP Type Sheave Adjustment



Note: Do not operate sheave with flange projecting beyond the hub end.

LVP Variable Speed Sheaves

Mounting:

1 Slide sheave on motor shaft so that the side of the sheave with setscrew **A** is next to the motor, when setscrew **A** is in the hub or barrel of the sheave.

2 When setscrew **A** is at an angle in the center flange **B**, mount it away from the motor so the outer locking ring and flange can be removed to get to the setscrew.

3 To remove the flange and locking ring:

- **a** Loosen setscrews **D**.
- **b** Loosen but **do not remove** capscrews **E**.
- **c** Remove key **F**. **(**This key projects a small amount to provide a grip for removing.)
- **d** Rotate the flange counterclockwise until it disengages the threads on the sheave barrel.

4 Verify that the driving and driven sheaves are in alignment and the shafts are parallel. When aligning two-groove sheaves, allow room between the sheave and motor to get to capscrews **E**.

5 Insert key **C** between the sheave and the shaft and tighten setscrew **A** securely.

6 If flange and locking ring have been removed, when replacing them make sure that the inner and outer flanges are open from the closed position by the same amount as the other flange. Determine this by accurately measuring the top width of the grooves.

7 Insert key **F**.

8 Tighten setscrews **D** and capscrews **E**.

9 Put on belts and adjust belt tension. **Do not force belts over grooves**. See "Fan Drive Belt Adjustment" on page 28.

10 Be sure that all keys are in place and all setscrews and all capscrews are tight before starting the drive. Check and retighten all screws and retension belts after approximately 24 hours of service.

Adjusting:

1 Slack off belt tension if belts have been installed.

2 Loosen setscrews **D**.

3 Loosen but **do not remove** capscrews **E**.

4 Remove key **F**. (This key projects out a small amount to provide a grip for removing.)

5 Adjust pitch diameter by opening or closing the movable flanges by half or full turns. (Two-groove sheaves are supplied with both grooves set at the same pitch diameter.) **Move both movable flanges the same number of turns to provide the same pitch diameter for satisfactory operation. Do not open sheaves more than five turns for A belts or six turns for B belts.**

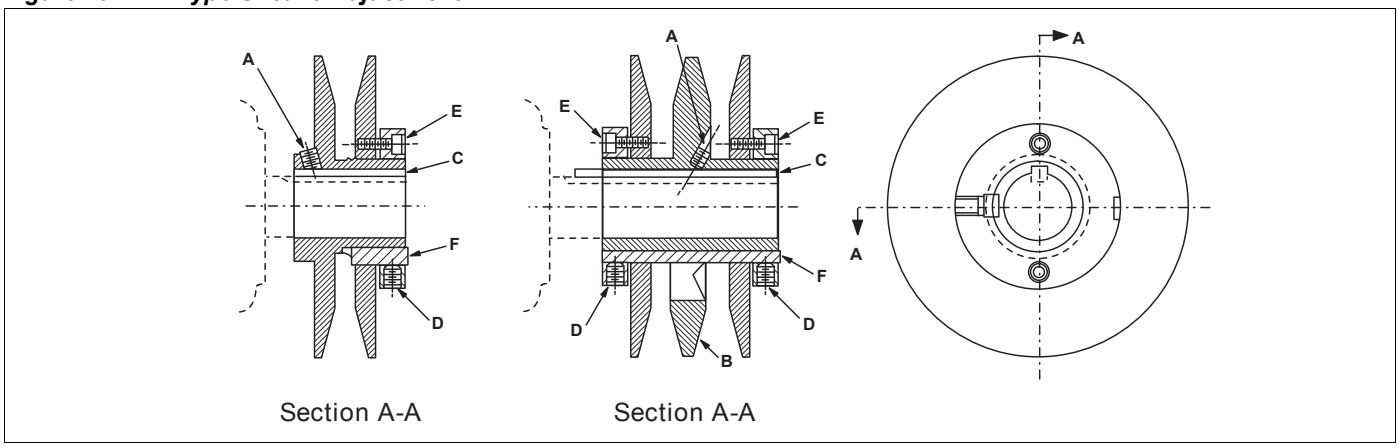
6 Replace key **F**.

7 Tighten setscrews **D** and capscrews **E**.

8 If belts have been installed, readjust belt tension. If belts have not been installed, install them and adjust belt tension. **Do not force belts over grooves** See "Fan Drive Belt Adjustment" on page 28.

9 Verify that all keys are in place and all setscrews and all capscrews are tight before starting the drive. Check and retighten all screws and retension belts after approximately 24 hours of operation.

Figure 40: LVP Type Sheave Adjustment



MVP Variable Speed Sheaves

Mounting:

1 Verify that both driving and driven sheaves are in alignment and the shafts are parallel. The centerline of the driving sheave must be in line with the centerline of the driven sheave. See Figure 26.

2 Before starting drive, verify that all setscrews are torqued to the values shown in Table 25. Check setscrew torque and belt tension after 24 hours of service.

Adjusting:

1 Adjust motor base forward to release belt tension. For easier adjustment, remove the belts.

2 Loosen, but do not remove both of the locking setscrews **A** in the outer locking ring by using a hex key or torque wrench with a hex bit.

3 Adjust sheave to desired pitch diameter by turning the outer locking ring. Use a spanner wrench or drift inserted into the three holes that are located 120° apart on the ring.

4 Any pitch diameter can be obtained within the sheave range. One complete turn of the outer locking ring changes the pitch diameter 0.233".

5 Do not open sheaves more than the following amounts:

- Do not open **B** sheaves more than 4 3/4 turns for the **A** belts or 6 turns for the **B** belts.
- Do not open **C** sheaves more than 9 1/2 turns.
- Do not open **5V** sheaves more than 6 turns.
- Do not open **8V** sheaves more than 8 turns.

6 Before operating the drive, tighten BOTH locking screws **A** in the outer locking ring. Use a torque wrench and tighten to the value shown in Table 25.

7 Replace belts and adjust the motor base to tension the belts properly. See "Fan Drive Belt Adjustment" on page 28.

8 Do not loosen any screws other than the two locking screws **A** in the outer locking ring when adjusting the sheave pitch. Do not operate the drive until the locking screws are set to the torque specifications.

Figure 41: Sheave Adjustment

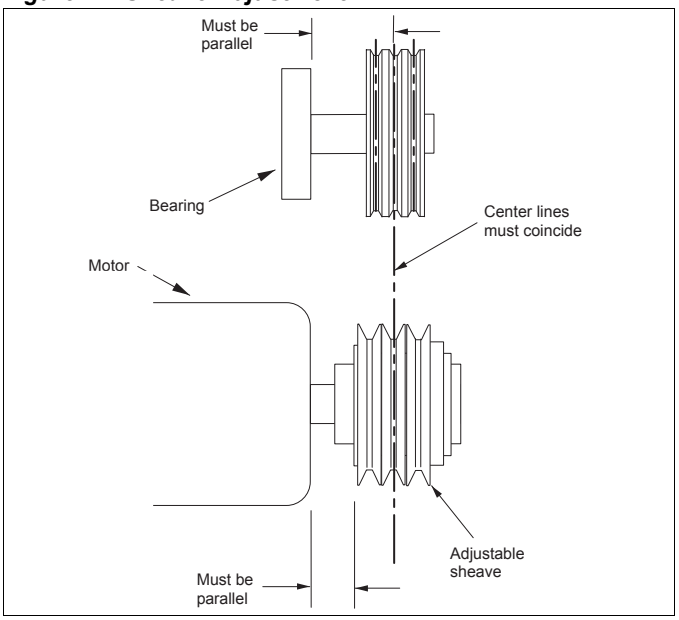
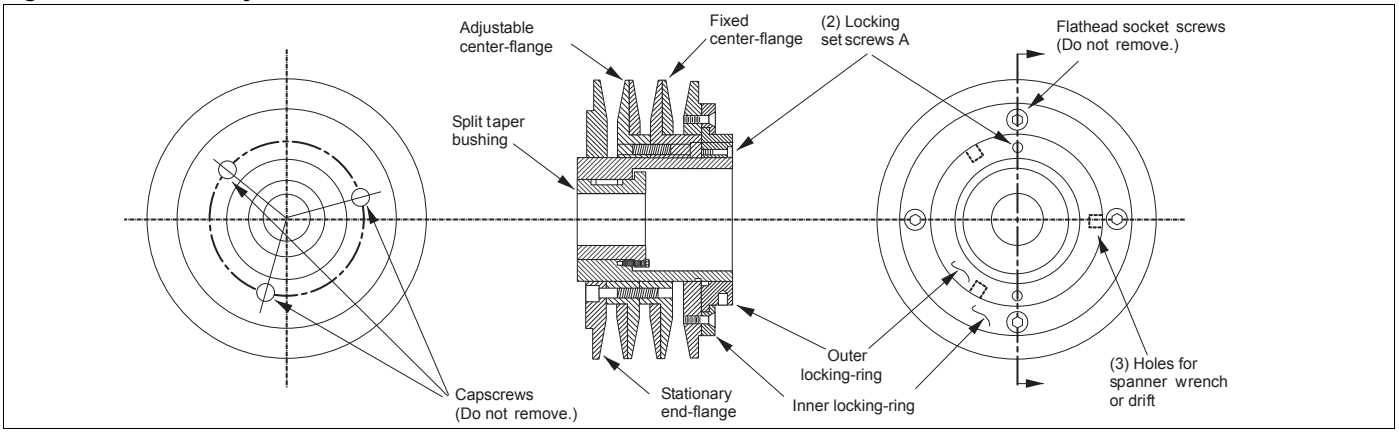


Table 33: Screw Torque Values

Nominal screw size (dia-thds/in)	Socket head cap screws		Flat head socket screws	Hollow head setscrews only			
				Lengths equal or greater than diameter		For lengths (L) less than diameter	
	Seating torque		Seating torque	Seating torque	Seating torque	Length (L)	Seating torque
	(in-lbs)	(ft-lbs)	(in-lbs)	(in-lbs)	(ft-lbs)	(in)	(in-lbs)
1/4-20NC	150	12.5	100	87	7.3	3/16	50
5/16-11NC	305	25.4	200	165	13.8	1/4	90
3/8-16NC	545	45.4	350	290	24.2	1/4, 5/16	150, 250
1/2-13NC	1300	108.3	N/A	620	51.7	N/A	N/A
5/8-11NC	N/A	N/A	N/A	1225	102.1	N/A	N/A

Figure 42: Sheave Adjustment



Fan Drive Belt Adjustment

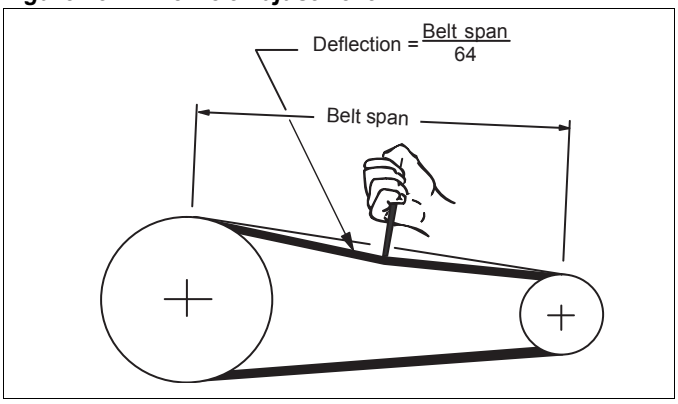
General Rules of Tensioning

1. The ideal tension is the lowest tension at which the belt does not slip under peak load conditions.
2. Check tension frequently during the first 24 to 48 hours of operation.
3. Over tensioning shortens belt and bearing life.
4. Keep belts free from foreign material, which may cause slippage.
5. Make V-drive inspection on a periodic basis. Adjust tension if the belt is slipping. Do not apply belt dressing. This may damage the belt and cause early failure.

Tension Measurement Procedure

1. Measure the belt span. See Figure 27.
2. Place belt tension checker squarely on one belt at the center of the belt span. Apply force to the checker, perpendicular to the belt span, until the belt deflection equals belt span distance divided by 64. Determine force applied while in this position.
3. Compare this force to the values in Table 10 on page 29.
4. Adjust to the minimum value. If the belts slip, add tension.

Figure 43: Drive Belt Adjustment



⚠ WARNING

Moving belt and fan can cause severe personal injury or death. During installation and filter maintenance:

- Lock and tag out fans to prevent accidental start up.
- Do not enter the filter compartment until the fan is completely stopped.
- Use approved equipment for reaching filters located above normal reach. Do not step on filter frames or unit components.
- Floor surfaces must be dry and free of oil or grease.

Table 34: Belt Deflection Force

Cross section	Sheave diameter (inches)		Deflection force (lbs)/belt deflection force			
	Smallest sheave diameter range	rpm range	Cross section A, B, 5V		Cross section AX, BX, 5VX	
			Min	Max	Min	Max
A, AX	3.0 to 3.6	1000 to 2500	2.8	5.5	3.0	6.1
		2501 to 4000	2.1	4.2	2.5	5.0
	3.8 to 4.8	1000 to 2500	3.4	6.8	3.7	7.4
		2501 to 4000	2.4	5.7	3.2	6.4
	5.0 to 7.0	1000 to 2500	4.0	8.0	4.7	9.4
		2501 to 4000	3.5	7.0	3.8	7.6
B, BX	3.4 to 4.2	850 to 2500	—	—	3.6	7.2
		2501 to 4000	—	—	3.1	6.2
	4.4 to 5.6	860 to 2500	4.0	7.9	5.2	10.5
		2501 to 4000	3.3	6.7	4.5	9.1
	5.8 to 8.6	860 to 2500	4.7	9.4	6.3	12.6
		2501 to 4000	4.5	8.9	5.4	10.9
5V, 5VX	4.4 to 6.7	500 to 1749	—	—	7.6	15.2
		1750 to 3000	—	—	6.6	13.2
		3001 to 4000	—	—	4.2	8.5
	7.1 to 10.9	500 to 1740	9.5	18.9	11.0	22.1
		1741 to 3000	8.3	16.7	10.0	20.1
	11.8 to 16.0	500 to 1740	11.7	23.4	12.7	25.5
		1741 to 3000	10.5	21.8	12.5	25.0

Coil Maintenance

⚠ CAUTION

SHARP EDGES AND COIL SURFACES are a potential injury hazard. Avoid contact with them.

⚠ ATTENTION

Les bords tranchants et les surfaces des bobines sont un risque de blessure. Ne les touchez pas.

1. For maximum performance, the coil must be clean. Check once a year under normal operating conditions and brush or vacuum clean if necessary. Use a chemical coil cleaner on multiple row coils. Read and follow the chemical cleaner's instructions since some cleaners may contain harsh chemicals. Take care not to damage fins while cleaning.
2. Drain pans in any air conditioning unit may have some moisture. Algae and other organisms can grow due to airborne spores and bacteria. Clean periodically to prevent build-up from plugging the drain and causing the drain pan to overflow. Keep drain pans clean to prevent the spread of disease. Cleaning should be performed by qualified personnel.
3. Dirt and lint can clog the condensate drain, especially with dirty filters. Inspect twice a year to help avoid overflow.

⚠ WARNING

Clean drain pan regularly so mold does not develop.

⚠ AVERTISSEMENT

Pour eviter la moisissure Nettoyer regulierement le bassin de recuperage.

Component Removal and Replacement

Panel Removal

Remove the screws located along the sides of the panel. Pull the panel out using the pocket pull handles. If the panel does not have a pull handle, remove the adjacent panel with a pocket pull or door and pop out the panel from the inside.

Fan Section Removal

The fan shaft, motor, and any drive components are removable through the access door or panel opening.

If fan replacement is required, the entire fan assembly can be pulled out the side of the cabinet. The fan assembly includes the fan housing, the bearing support, and the fan base.

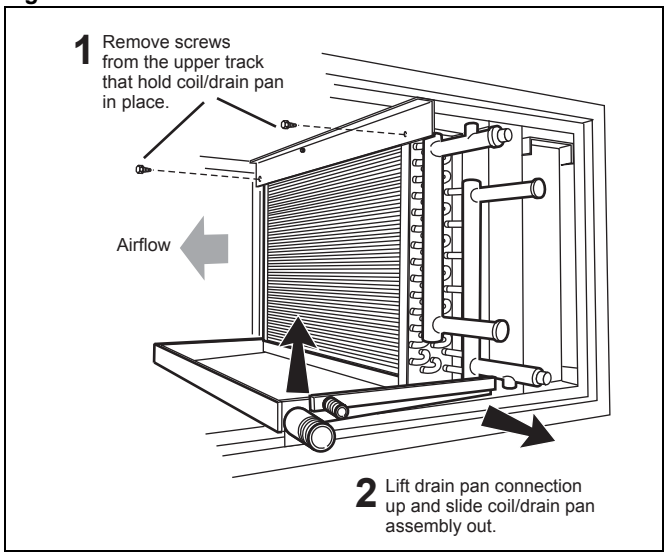
1. To remove the fan assembly, remove the side panels (follow instructions for side panel removal).
2. Disconnect the neoprene bulkhead seal that is attached to the fan discharge. Then disconnect the fan sled from each of the corner mounts and pull the entire assembly out the side of the unit.
3. Loosen the fan bearings and pull out the shaft. Disconnect the fan housing from the fan sled and bearing support by removing the attaching bolts.
4. Replace the new fan, reconnect the shaft and bearings and put the fan assembly in the cabinet. Replace panels and fasteners.

Coil Removal and Replacement

Before removing the coil, disconnect all piping.

1. Remove exterior panels from both sides of the coil section. Remove screws that secure the top of the leaving coil face to the upper track on the inside top of the unit.
2. Lift drain pan condensate connection above the unit frame flange and slide drain pan, coil(s), and baffles out of unit.
3. Slide the coil, blockoffs, and drain pan assembly back into unit the same way it was removed. Check the installation for an airtight fit.
4. Reinstall screws that secure the top of the leaving coil face to the upper track on the inside top of the unit.

Figure 44: Coil Removal


1 Remove screws from the upper track that hold coil/drain pan in place.
Airflow
2 Lift drain pan connection up and slide coil/drain pan assembly out.

Warranty Details

Consult your local McQuay Representative for warranty details. Refer to Form 933- 430285Y. To find your local McQuay Representative, go to www.mcquay.com.

Warranty Return Material Procedure

Defective material may not be returned without permission of authorized factory service personnel of McQuay International in Minneapolis, Minnesota, (763) 553-5330. A “Return Goods” tag must be included with the returned material. Enter the required information to expedite handling and prompt issuance of credits. All parts must be returned to the appropriate McQuay facility, designated on the “Return Goods” tag. Transportation charges must be prepaid.

The return of the part does not constitute an order for replacement. Therefore, a purchase order must be entered through the nearest McQuay representative. The order should include part number, model number, and serial number of the unit involved.

Credit will be issued on customer’s purchase order following an inspection of the return part and upon determination that the failure is due to faulty material or workmanship during the warranty period.

Replacement Parts

When writing to McQuay for service or replacement parts, refer to the model number and serial number of the unit stamped on the serial plate attached to the unit. If replacement parts are required, mention the date of installation of the unit and date of failure, along with an explanation of the malfunctions and a description of the replacement parts required.

Destiny Equipment Warranty Registration Form

McQuay® Air Conditioning

To comply with the terms of McQuay Warranty, complete and return this form within 10 days to McQuay Warranty Department.

Check, test, and start procedure for McQuay Air Handling Units.

Job Name:_____ **McQuay S.O. No.:** _____ **McQuay G.O. No.:** _____

Installation address: _____

City: _____ **State:** _____

Purchasing contractor:_____

City: _____ **State:** _____

Name of Person doing start-up (print)_____

Company name _____

Address _____

City/State/Zip_____

Unit model number: _____ **Unit serial number:** _____

SF VFD model number:_____ **Serial number:** _____ N/A

RF VFD model number:_____ **Serial number:** _____ N/A

Circle Yes or No. If not applicable to the type of unit, circle N/A.

I. INITIAL CHECK

A. Is any shipping damage visible?	Yes	No	N/A
B. Are fan drives properly aligned and belts properly adjusted?	Yes	No	N/A
C. Tightened all setscrews on pulleys, bearings and fans?	Yes	No	N/A
D. Have the hold-down bolts been backed off on spring mounted fan isolators?	Yes	No	N/A
E. With power off, do fans turn freely by hand?	Yes	No	N/A
F. Electrical service corresponds to unit nameplate?	Yes	No	N/A
Volts _____ Hertz _____ Phase _____			
G. Is the main disconnect adequately fused and are fuses installed?	Yes	No	N/A
H. Are all electrical power connections tight?	Yes	No	N/A
I. Is the condensate drain trapped?	Yes	No	N/A
J. Fill drain pan. Does water drain freely?	Yes	No	N/A
K. Is the unit mounted level?	Yes	No	N/A

II. FAN DATA

A. Check rotation of supply fan	Yes	No	N/A
B. Voltage at supply fan motor: 1–2 _____V 2–3_____V 1–3 _____ V			
C. Supply fan motor amp draw per phase: L1_____ L2 _____ L3 _____			
D. Overload amp setting: _____			
E. What is the supply fan rpm? _____			
F. Record supply static pressure at unit discharge: _____ inches of H_20			
G. Record return static pressure at unit (with outside air dampers closed)_____ inches of H_20			

III. DAMPERS

A. Are blades and seals present?	Yes	No	N/A
B. Do dampers open smoothly and shut tight?	Yes	No	N/A

IV. ELECTRIC HEAT

A. Electrical heat service corresponds to unit nameplate?	Yes	No	N/A
_____ Volts _____Hertz _____Phase			
B. Are there any signs of physical damage to the electric heat coils?	Yes	No	N/A
C. Have all electrical terminals been tightened?	Yes	No	N/A
D. Does sequence controller stage contactors properly?	Yes	No	N/A
E. Electric heater voltage across each phase: L1–2_____ V L2–3 _____ V L1–3 _____ V			

F. Amp draw across each phase at each heating stage:

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Phase L1:	_____	_____	_____	_____	_____	_____
Phase L2:	_____	_____	_____	_____	_____	_____
Phase L3	_____	_____	_____	_____	_____	_____

G. FLA: L1 _____ L2 _____ L3_____

H. Operate electric heat with fans off. Electric heat must cycle OFF on high limit control. . . . . Yes No N/A

V. CHILLED WATER COIL

A. Pressure test okay? . . . . . Yes No N/A

B. Drain pan draining okay? . . . . . Yes No N/A

VI. HOT WATER COIL

A. Pressure test okay? . . . . . Yes No N/A

VII. Variable Frequency Drive (VFD)

A. VFD control in manual . . . . . Yes No N/A

1. Minimum speed not less than 20 Hz . . . . . Yes No N/A
2. Amps at minimum speed_____
3. Amps at 60 Hz_____

B. Automatic control functioning . . . . . Yes No N/A

C. Type of auto control (circle one) 0 -10 VDC 4 - 20 mA Other

Signature: _____ Startup date:_____

RETURN COMPLETED FORM WITHIN 10 DAYS OF START-UP TO:
McQuay International Warranty Department, 13600 Industrial Park Boulevard, Minneapolis, MN 55441

Please list any additional comments that could affect the operation of this unit; e.g., shipping damage, failed components, adverse installation applications, etc., on a separate sheet and attach to this form.

Quality Assurance Survey Report

Quality Assurance Survey Report

To whom it may concern:

Please review the items below upon receiving and installing our product. Mark N/A on any item that does not apply to the product.

Job Name: _____ McQuay G.O. no. _____

Installation Address: _____

City: _____ State: _____

Purchasing Contractor: _____

City:_____ State: _____

Name of person doing start-up (print): _____

1. Is there any shipping damage visible? . . . . . Yes No N/A

__Location on unit _____

2. How would you rate the overall appearance of the product; i.e., paint, fin damage, etc.?

Excellent Good Fair Poor

3. Did all sections of the unit fit together properly? . . . . . Yes No N/A

4. Did the cabinet have any air leakage? . . . . . Yes No N/A

Location on unit _____

5. Were there any refrigerant leaks? . . . . . Yes No N/A

Shipping Workmanship Design

6. Does the refrigerant piping have excessive vibration? . . . . . Yes No N/A

Location on unit _____

7. Did all of the electrical controls function at start-up? . . . . . Yes No N/A

Comments _____

8. Did the labeling and schematics provide adequate information? . . . . . Yes No N/A

9. How would you rate the serviceability of the product?

Excellent Good Fair Poor

10. How would you rate the overall quality of the product?

Excellent Good Fair Poor

11. How does the quality of McQuay products rank in relation to competitive products?

Excellent Good Fair Poor

Comments:

Please list any additional comments which could affect the operation of this unit; i.e., shipping damage, failed components, adverse installation applications, etc. If additional comment space is needed, write the comment(s) on a separate sheet, attach the sheet to this completed Quality Assurance Survey Report, and return it to the Warranty Department with the completed preceding “Equipment Warranty Registration Form”.

McQuay Training and Development

Now that you have made an investment in modern, efficient McQuay equipment, its care should be a high priority. For training information on all McQuay HVAC products, please visit us at www.mcquay.com and click on training, or call 540-248-9646 and ask for the Training Department.

Warranty

All McQuay equipment is sold pursuant to its standard terms and conditions of sale, including Limited Product Warranty. Consult your local McQuay Representative for warranty details. Refer to Form 933-43285Y. To find your local McQuay Representative, go to www.mcquay.com.

This document contains the most current product information as of this printing. For the most up-to-date product information, please go to www.mcquay.com.

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